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Copy No. 46  
DOE/RL-91-17  
Revision 0  
Volume 2 of 2  
UC-630, 721

**Hanford Central  
Waste Complex —  
Radioactive Mixed  
Waste Storage  
Facility Dangerous  
Waste Permit  
Application**

Date Published  
October 1991

**BEST AVAILABLE COPY**



United States  
Department of Energy  
P. O. Box 550  
Richland, Washington 99352

Approved for Public Release

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APPENDIX 4A

CONSTRUCTION SPECIFICATIONS

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2  
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APPENDIX 4A

CONSTRUCTION SPECIFICATIONS

- 1  
2  
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4  
5  
6  
7 4A-1 Construction Specification W-033-C2/V-W033C2-001, As-Built Rev. 1,  
8 for Radioactive Mixed Waste Storage Facilities  
9  
10 4A-2 Construction Specification V-W033C1-001, As-Built Rev. 1,  
11 for Radioactive Mixed Waste Storage Facility  
12  
13 4A-3 Construction Specification W-016H-C1, As-Built Rev. 1,  
14 For Radioactive Mixed Waste Storage Facilities  
15  
16 4A-4 Construction Specification ER1372-C1, As-Built Rev. 0a,  
17 for Radioactive Mixed Waste Storage Pads  
18  
19 4A-5 Construction Specification W-032-C1, As-Built Rev. 1,  
20 for Radioactive Mixed Waste Storage Building  
21  
22 4A-6 Hazardous Material Storage Vendor Brochure, Justrite Manufacturing  
23 Company, Des Plaines, Illinois  
24  
25 4A-7 Construction Specification ER1372-C1 for Radioactive Mixed Waste  
26 Storage Pads  
27  
28 4A-8 Construction Specification ER-1372-C2 for RMW Storage  
29 Pads/Special Protective Coating  
30  
31 4A-9 Specification for Three Each Flammable Storage Modules 4, 5,  
32 and 6 (WFJ-XVV-638457 CHEM-STOR, Inc., Mfgr.)  
33  
34 4A-10 Specification for Two Each Flammable Storage Modules 7 and 8  
35 (RDV-EXV-552432 Safety Storage Inc., Mfgr.)  
36  
37 4A-11 Specification for Electrical Storage Modules 7 and 8  
38 (H-2-81296, sheet 3 of 3)  
39  
40 4A-12 Specification for Civil Asphalt Storage Pad  
41 (200-W Area, H-2-90264)  
42  
43 4A-13 Construction Specification W-016H-C3, Rev. 2, for Radioactive  
44 Mixed Waste Storage Facilities  
45

APPENDIX 4A-1

CONSTRUCTION SPECIFICATION W-033-C2/V-W033C2-001,  
AS-BUILT REV. 1, FOR RADIOACTIVE MIXED  
WASTE STORAGE FACILITIES

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W-033-C2/V-W033C2-001/V-W033C2-002  
AS-BUILT REV. 1 *mak*

CONSTRUCTION SPECIFICATION

FOR  
RADIOACTIVE MIXED WASTE STORAGE FACILITIES

Original Issue: 05-24-89

Prepared By:

KAISER ENGINEERS HANFORD COMPANY  
Richland, Washington

For the US Department of Energy

Contract DE-AC06-87RL10900

OFFICIAL RELEASE  
BY WHC  
DATE NOV 12 1990  
*Sta #10*

*NE Wellefing*  
Client Concurrence \_\_\_\_\_ Date *8-29-90*

*M. Henderson*  
Project Manager \_\_\_\_\_ Date *9/12/90*

*J. C. McEnroe*  
Lead Engineer \_\_\_\_\_ Date *9-10-90*

*[Signature]*  
Field Concurrence \_\_\_\_\_ Date *8/23/90*

*M. A. Kubende*  
Checked By \_\_\_\_\_ Date *7-31-90*

*RH Bankemper*  
Prepared By \_\_\_\_\_ Date *7-31-90*

ECNs affecting specification.

ECN W-033-10  
01400 - 3  
01720 - 2

ECN W-033-13  
15500 - 2  
16400 - 4

ECN W-033-19  
16400 - 6

ECN W-033-29  
01300 - 3  
01400 - 3  
07920 - 1

ECN W-033-31  
01400 - 3  
15500 - 3

ECN W-033-12  
01010 - 1  
08710 - 2  
09900 - 8

ECN W-033-17  
02200 - 1

ECN W-033-21  
16400 - 4

ECN W-033-25  
09805 - 1

ECN W-033-30  
09900 - 8

ECN W-033-32  
09900 - 1,3

W033C2.AB

W-033-C2

CONSTRUCTION SPECIFICATION  
FOR  
RADIOACTIVE MIXED WASTE STORAGE FACILITIES  
WHC V-W033C2-001

Work Order CR0510 CR9060  
CR0511 CR9061  
CR0512 CR9062  
CR0513 CR9063  
CR0514 CR9064  
CR9065

Prepared By:

KAISER ENGINEERS HANFORD COMPANY  
Richland, Washington

For the US Department of Energy

Contract DE-AC06-87RL10900

<u>Jack C. McConnel</u> Principal Lead Engineer	<u>4-26-89</u> Date	<u>D.C. Robbins</u> Technical Documents	<u>4/27/89</u> Date
<u>A.L. Munster</u> Safety	<u>4/27/89</u> Date	<u>Simado P. Ray</u> Environmental	<u>4/27/89</u> Date
<u>J.E. Breed</u> Quality Engineering	<u>4/27/89</u> Date	<u>Fl. Hamada</u> Project Manager	<u>5/24/89</u> Date
WESTINGHOUSE HANFORD COMPANY			
<u>R.L. Morin</u>	Projects Department		<u>5/24/89</u> Date

Released for Construction:

J/A  
U. S. Department of Energy

Date

W-033-C2.FPD.1816



## TABLE OF CONTENTS

### Total Pages

<u>DIVISION 1 - GENERAL REQUIREMENTS</u>	
Section 01010 Summary of Work	2
Section 01019 Items Furnished for Construction	3
Section 01027 Application for Payment	4
Section 01040 Coordination	1
Section 01043 Jobsite Administration	3
Section 01050 Survey and Field Engineering	2
Section 01065 Permits	2
Section 01200 Project Meetings	2
Section 01300 Submittals	4
Section 01310 Progress Schedules	3
Section 01400 Quality Assurance	4
Section 01500 Construction Facilities and Temporary Controls	5
Section 01630 Product Option and Substitution	4
Section 01720 Project Record Documents	2
 <u>DIVISION 2 - SITEWORK</u>	
Section 02200 Earthwork	6
Section 02235 Road Subgrade and Granular Base	5
Section 02668 Fire Water Systems	7
Section 02720 Storm Sewage Systems	1
 <u>DIVISION 3 - CONCRETE</u>	
Section 03300 Cast-In-Place Concrete	6
 <u>DIVISION 7 - THERMAL AND MOISTURE PROTECTION</u>	
Section 07200 Insulation	2
Section 07920 Sealants and Calking	3
 <u>DIVISION 8 - DOORS AND WINDOWS</u>	
Section 08100 Metal Doors and Frames	2
Section 08710 Finish Hardware	2
 <u>DIVISION 9 - FINISHES</u>	
Section 09250 Gypsum Board	4
Section 09805 Special Protective Coating	4
Section 09900 Painting	8
 <u>DIVISION 15 - MECHANICAL</u>	
Section 15300 Fire Protection	7
Section 15500 Heating, Ventilating, and Air Conditioning	4
 <u>DIVISION 16 - ELECTRICAL</u>	
Section 16400 Service and Distribution (600-Volt and Below)	11
Section 16720 Alarm and Detection Systems	9

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SECTION 01010  
SUMMARY OF WORK

PART 1 - GENERAL

1.1 INTRODUCTION

1.1.1 The RMW Storage Facilities are located in the 200 West Limited Area of the Hanford Site, approximately 32 miles northwest of Richland, Washington.

1.1.2 This Specification is for Phase II of Projects W-033, W-034, W-035, W-036, W-037, W-067, W-068, W-069, W-070, W-071, and W-072. Phase II shall incorporate the site work, mechanical and electrical work, including certain related work, for 11 buildings.

1.1.3 Phase I of the above projects included the site preparation for the buildings only and the construction of the foundations, slabs on grade and the pre-engineered metal buildings.

1.2 STATEMENT OF WORK

1.2.1 Work included: The itemization included herein is intended to be broad in scope to identify major elements. The work shall include, but not be limited to, the following:

1.2.1.1 Grading, roadbed preparation, and stabilization of site.

1.2.1.2 Construction of the underground fire protection water lines.

1.2.1.3 Design and construction of the dry-pipe fire protection system in the buildings.

1.2.1.4 Construction of the fire alarm system.

1.2.1.5 Construction of the fire riser enclosure and the concrete slab the enclosure is built on.

1.2.1.6 Construction of the electrical service and distribution of the buildings.

1.2.1.7 Provide and install baseboard heaters, louvers, and exhaust fans.

1.2.1.8 Provide and apply a special protective coating on the interior floors to provide an impervious containment area inside the buildings.

1.2.1.9 Provide and install the Beta/Gamma cam assemblies.

1.2.1.10 Provide and install gutters, downspouts, and splashblocks.

ECN-12

1.2.2 Work Not Included: The following items of work are not included in this contract:

1.2.2.1 Grading of building sites.

1.2.2.2 Construction of the foundations, concrete slabs (except the slab to be poured after the fire water supply line is installed) and the metal buildings.

1.2.2.3 Installation of the asphaltic concrete pavement.

1.2.2.4 Installation of the cable shown in Section A of Drawing H-2-80738 to the building foundation.

### 1.3 DRAWINGS

1.3.1 The Drawings which describe the work covered by these Contract Documents are listed on the Schedule of Drawings.

### PART 2 - PRODUCTS

Not Used

### PART 3 - EXECUTION

Not Used

END OF SECTION

SECTION 01019

ITEMS FURNISHED FOR CONSTRUCTION

PART 1 - GENERAL

1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

1.1.1.1 Code of Federal Regulations (CFR)

Title 30  
Subchapter N

Mineral Resources  
Metal and Nonmetal Mine Safety  
and Health

30 CFR 56

Safety and Health Standards -  
Surface Metal and Nonmetal Mines

1.2 SUBMITTALS: Not Used

1.3 GENERAL

1.3.1 Material and equipment furnished or made available to be incorporated into the Work are set forth in this Section. Other services and utilities provided are covered in other sections of this Specification.

1.3.2 Comply with provisions of Section 9 of the Contract General Conditions for all items furnished for construction.

1.3.3 Provide KEH access to the premises where items furnished for construction are stored before incorporation into the Work.

1.4 GRAVEL AND SAND.

1.4.1 Gravel and sand from unmined natural deposits is available at no cost from sites designated by KEH within 4 miles of the project site. KEH makes no representation that unmined materials will meet physical properties required in this Specification.

1.4.2 If the Contractor elects to utilize the available gravel sites, he shall furnish all equipment and labor required to excavate, process, load, transport, and place the gravel and sand.

1.4.3 Material from the gravel sites shall be used only for the work covered by this Specification and no gravel or sand, processed or nonprocessed, or concrete manufactured therefrom shall be transported off the Hanford Site.

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1.4.4 Access to gravel sites and travel between gravel sites and construction sites shall be on roads designated by KEH and the use shall be in compliance with the requirements of Section 01500 of this Specification.

1.4.5 Operations at the gravel sites shall be in compliance with the following requirements.

1.4.5.1 Confine removal of overburden and top soil to areas designated by KEH. Stabilize blow sand areas after surface has been disturbed with ballast or other approved method to prevent wind erosion.

1.4.5.2 Make no excavation or bank cut within 100 feet of powerlines, paved roads, railroads, security fences, or other permanent structures.

1.4.5.3 Excavation and processing shall be in accordance with 30 CFR 56, Safety and Health Standards. Correct operations identified by KEH to be hazardous to life or property.

1.4.5.4 Explosives are prohibited articles as described in Section 56 of the Contract General Conditions and shall not be brought to the Hanford Site or proposed for use without written KEH approval.

1.4.5.5 Temporary structures are permitted at the gravel site for offices, storage, or repair facilities necessary for the gravel removal and processing operations. No facility for habitation shall be permitted.

1.4.5.6 Use of gravel sites shall be nonexclusive. Others may also enter the gravel sites to excavate material required for other work.

1.4.5.7 Upon completion of operations the gravel site shall be cleared of debris, temporary structures, and equipment. The excavated area shall be graded, banks properly sloped, and stabilized to prevent wind erosion. Conditions identified by KEH as not meeting these requirements shall be corrected before final acceptance of the Work.

1.4.5.8 The right to use the gravel sites may be terminated by KEH for failure to comply with requirements set forth herein or for abandonment of operations under this contract. The right to use the gravel site shall terminate without notice upon acceptance of Work under this Contract.

## 1.5 MATERIALS AND EQUIPMENT

1.5.1 Materials and equipment listed below will be furnished by KEH, without cost to the Contractor, for incorporation into the Work for the pre-engineered metal buildings.

1.5.1.1 One radio fire alarm box complete with internal electronic components.

1.5.1.2 One antenna with approximately 20 lineal feet of coaxial cable.

1.5.2 Other materials and equipment shown or specified in the Specifications and the Drawings required to complete the Work shall be furnished by the Contractor.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

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## SECTION 01027

### APPLICATION FOR PAYMENT

#### PART 1 - GENERAL

1.1 REFERENCES: Not Used

1.2 SUBMITTALS: Not Used

1.3 FORMAT

1.3.1 Complete Form KEH-1026.00, Progress Estimate Backup (sample appended), furnished by KEH. When completing the Progress Estimate Backup, utilize the Progress Schedule pay items developed per Section 01310, Paragraph 1.3.3.

1.3.1.1 Contractor developed forms may be substituted only with prior approval of KEH.

1.3.1.2 Include the following information when requesting payment utilizing form KEH-0949.00, furnished by KEH:

Subtotal Value of All Pay Items	\$ X,XXX.XX
Completed to Date (Include all modifications)	

Allowance for Material Stored on Site:

Previous Net Allowance	\$X,XXX.XX	
Minus Materials Placed	X,XXX.XX	
Plus Materials Stored	<u>X,XXX.XX</u>	
Net Allowance		\$ X,XXX.XX

Subtotal Value Completed to Date		\$ X,XXX.XX
Less Previous Payments	\$X,XXX.XX	
Less Other Charges from KEH	<u>X,XXX.XX</u>	
Subtotal Deductions		<u>(X,XXX.XX)</u>

Total Payment Requested		\$ X,XXX.XX
Less Retainage @ ____%		<u>(X,XXX.XX)</u>

Total Payment Allowed		\$ X,XXX.XX
-----------------------	--	-------------

#### 1.4 APPLICATION PROCEDURE

1.4.1 Payments to Contractor as set forth in Section 15 of Contract General Conditions are initiated by the Contractor making an application for payment as follows:

1.4.1.1 Prepare an application for payment by completing forms furnished by KEH. Each application for payment shall include, as a minimum, a breakdown of the contract price for each item listed in Section 01310 and the percent complete for each item.

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1.4.1.2 Review the application with the KEH Field Engineer approximately 5 days before end of the pay period and adjust the data if required by the Field Engineer.

#### 1.5 PAYMENT PROCEDURE

1.5.1 After signing the payment documents the original shall be forwarded to KEH for processing. No processing of checks will be done by KEH until the signed payment document is received.

1.5.2 KEH will mail the check to the Contractor's designated office.

#### 1.6 ADDITIONAL DATA REQUIRED

1.6.1 When processing applications for payment and preparing payment documents, KEH may require data to substantiate and justify amounts requested. Processing of payment documents may be delayed if data is not forwarded expeditiously to KEH.

1.6.2 Requests for payment for equipment or material which the Contractor has received, but has not installed, shall be accompanied by invoice or other data to provide evidence that the title to such equipment or material is held by the Contractor.

#### PART 2 - PRODUCTS

Not Used

#### PART 3 - EXECUTION

Not Used

## PROGRESS ESTIMATE BACKUP

Sheet of

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КЕН-1026.00 (03-87)

01027 - 3

W-033-C2  
As-Built Rev 1

Contract or P O. No.

Estimate No.

Date

Name of Contractor

Address

Nature of Work

Initial Amount of Contract

\$

Total Amount of Modifications to Date

\$

Total Adjusted Contract Amount

\$

Description

Amount

Estimated Work Completed to (Date)

Less:

Previous Payments

\$

Other Charges  
(Explain Below)

\$

Total Deductions

(\$

)

Adjusted Payment Requested

\$

Less Retainage @ \_\_\_\_\_ %

\$

Total Payment Allowed

\$

I certify that I have verified this periodical estimate dated \_\_\_\_\_ for \$ \_\_\_\_\_ and that to the best of my knowledge and belief it is a true and correct statement of work performed and that the contractor's statement of his account and amount due him is correct and just, and the quantities included in this estimate have been performed in full accordance with the terms and conditions of the corresponding construction documents.

FOR THE CONTRACTOR

KAISER ENGINEERS HANFORD COMPANY

By \_\_\_\_\_

By \_\_\_\_\_

SECTION 01040

COORDINATION

PART 1 - GENERAL

1.1 REFERENCES: Not Used

1.2 SUBMITTALS: Not Used

1.3 CONSTRUCTION ACTIVITIES

1.3.1 Coordinate construction activities to assure efficient and orderly sequence of work, with provisions for accommodating items to be installed later.

1.3.2 As noted in Section 29 of the Contract General Conditions, other contracts may be under construction concurrently with the work included in this Specification. The Contractor shall coordinate his activities with those of other contractors for the mutual benefit of all. Coordination meetings may be required in addition to progress meetings to keep all parties informed of scheduled activities at interface points.

1.4 WORK IN EXISTING FACILITIES

1.4.1 Buildings 2401-W and 2402-W, as well as the RMW Storage Pads, are operating facilities in the vicinity of the worksite and work must be planned and scheduled to minimize interference with plant operations and to sustain the safety of operating personnel.

1.4.2 Access to the work area shall be only as directed by KEH to minimize disruptions to work force.

1.4.3 Keep work area safe and orderly for construction personnel and operating personnel. Clean work area after each work period and stack tools and materials away from traffic areas.

1.5 ACCESS TO WORK AFTER POSSESSION: Access to warranty work as set forth in Section 24 of Contract General Conditions or access to work after possession as set forth in Section 20 of Contract General Conditions will be coordinated by KEH with other contractors and users of the facility. Notify KEH in advance of proposed work to minimize disruptions.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

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SECTION 01043

JOB SITE ADMINISTRATION

PART 1 - GENERAL

1.1 REFERENCES: Not Used

1.2 SUBMITTALS: Not Used

1.3 WORKING HOURS

1.3.1 Work shall be performed during regular day shift which is 7:30 a.m. to 4:00 p.m., Monday through Friday, excluding holidays.

1.3.2 Work other than regular day shift requires KEH approval in advance, as set forth in Section 51 of Contract General Conditions.

1.4 BADGE, DOSIMETER, AND ORIENTATION: The Work is located within the Controlled Access Area and inside a Limited Area and badge, basic dosimeter requirements, and orientation will be in accordance with Section 56 of Contract General Conditions.

1.5 EVACUATION DRILLS

1.5.1 Personnel working inside Limited Areas are required to participate in emergency evacuation drills which are held approximately once every 3 months and last approximately 1 hour.

1.5.2 Maintain daily log or other suitable record of names of all personnel including subcontractors working inside the Limited Area.

1.6 SECURITY

1.6.1 Policy and Procedures: Contractor employees are required to comply with security policies and procedures set forth in Sections 56 and 87 of Contract General Conditions. Copies of the Safeguards and Security Manual will be provided to the Contractor upon request after award of Contract.

1.6.2 Security Escorts

1.6.2.1 Contractor personnel not having "5" or "3" security clearance, working within 200-West Limited Area require security escorts. Escorts are provided by KEH at no cost except as set forth in subparagraph 1.6.2.4.

1.6.2.2 Provide list of employees and vehicles to be used inside the Limited Area(s) and anticipated start and duration of utilization. Provide list one week before start of work in the Limited Area for escort requirement determination. Provide weekly work schedules of employees, not later than Thursday of preceding week (minimum 24 hour notice required for changes), for KEH to provide sufficient escorts.

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1.6.2.3 Escorts will be assigned from the KEH trailer located outside 200-East Limited Area near Access Gate No. 814. Personnel shall meet and transport assigned escorts from that location. Provide space within contractor vehicles to accommodate number of escorts required. A minimum of one escort is required in each vehicle.

1.6.2.4 The Contractor may be charged for escorts when escorts have been requested and the Contractor personnel does not show up at time and place specified. The charges will be made at the rate of \$15.00 per hour for each escort for time lost waiting for Contractor personnel.

### 1.6.3 Security Clearances

1.6.3.1 Security clearances for Contractor employees may be provided for this Work and reduce the requirements for security escorts during construction. Requests for "5" clearance will be considered under the following circumstances.

1.6.3.2 Contractor has a contract with KEH for work within a Limited Area and has a minimum of 60 calendar days of onsite work remaining when request for clearance is received.

1.6.3.3 Clearances requested are for full-time employees, including crafts expected to be employed for duration of Contract.

1.6.3.4 A personnel security questionnaire (PSQ) shall be completed for each person requesting clearance immediately after Contract award or as soon as onsite personnel requirements are known. Personnel security questionnaire forms available upon request.

1.6.3.5 Employees that received security clearances are required to sign a Security Termination Form, furnished by KEH, and return the form with the security badge when their Work is completed or the Contract terminated.

## 1.7 SAFETY REQUIREMENTS

### 1.7.1 Fire Safety

1.7.1.1 The Contractor is required to address fire safety as part of his construction safety plan as required by Section 55 of Contract General Conditions. The following fire safety requirements are to be incorporated into the construction safety plan.

a. Portable shields shall be utilized wherever the Contractor is welding, cutting, or grinding.

b. Maintain a fire watch a minimum of 1/2 hour after the cessation of welding, cutting, or grinding.

c. Fully charged fire extinguishers shall be available whenever welding, cutting, or grinding.

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d. Method to control the ignition of brush fires.

e. Method to comply with requirements for off road driving and grass fire prevention given in Section 01500.

#### 1.7.2 Safety Apparel

1.7.2.1 Personnel shall wear appropriate foot wear in a recognized construction area. Tennis shoes, canvas type shoes, or open toe shoes do not meet this requirement.

1.7.2.2 Hard hats shall be worn by all personnel present at the jobsite when in operation areas other than administrative offices, lunch areas, or restrooms.

#### PART 2 - PRODUCTS

Not Used

#### PART 3 - EXECUTION

Not Used

END OF SECTION

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SECTION 01050

SURVEY AND FIELD ENGINEERING

PART 1 - GENERAL

1.1 REFERENCES: Not Used

1.2 SUBMITTALS: Not Used

1.3 QUALITY CONTROL

1.3.1 Establishing alignment, support location, and grades shall be the responsibility of a Land Surveyor registered in the State of Washington and acceptable to KEH.

1.3.2 Field notes, records, and documentation shall be available to KEH to review and verify the procedures used and the accuracy of work.

1.4 SURVEY DATA

1.4.1 Basic reference points with coordinate descriptions and bench marks with elevation identified, will be located in the field by the KEH representative. Detail surveys shall be by Contractor. Contractor shall be responsible for preservation of bench marks and reference points, including stakes or other markers established until removal is authorized by KEH.

1.4.2 From information and dimensions indicated on the construction drawings, the Contractor shall perform all survey/layout as may be required by the Work.

1.5 PROCEDURES

1.5.1 Before initial layout, field verify horizontal and vertical data. Report any discrepancies to KEH before proceeding.

1.5.2 Establish an adequate number of permanent reference points to be used during construction referenced to original control points. Record locations with horizontal and vertical data on Project Record Documents.

1.5.3 Protect and preserve control points and reference points until work is complete. Report to KEH the loss or destruction of any control point. Report the relocation or change in data affecting the reference points.

1.5.4 Periodically verify data for each control point, reference point, and construction staking to maintain construction accuracy.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

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## SECTION 01065

### PERMITS

#### PART 1 - GENERAL

1.1 REFERENCES: Not Used

1.2 SUBMITTALS: Not Used

1.3 FEDERAL, STATE, AND MUNICIPAL LAWS, CODES, AND REGULATIONS: Permits or licenses to do business as required by Federal, State, and Municipal laws, codes, and regulations are the sole responsibility of the Contractor as stated in Section 6 of Contract General Conditions.

#### 1.4 HANFORD SITE PERMITS

1.4.1 General: Before certain types of work can be done at Hanford, the Contractor is required to have a permit. These permits are provided by KEH at no cost to the Contractor, however, the Contractor must furnish information required and must notify KEH in advance of work for which permit is required. The Contractor shall comply with requirements and restrictions set forth in each permit.

1.4.2 Excavation: As set forth in Subsection 50.9 of Contract General Conditions no excavation shall be done without an Excavation Permit. Permit will be issued before start of construction and is for duration of the Work. Post permit at site of Work.

1.4.3 Backfill Permit: Permit required for each element of fill and backfill and good for 5 days or duration of work element, provided Work does not stop for 5 consecutive days. Permit form furnished by KEH shall be completed by Contractor and returned to KEH for approval before starting work. Permit shall be kept at worksite.

1.4.4 Welding and Cutting Permit: All welding or flame cutting requires welding and cutting permit. Permit is (good for duration of Contract.) (required for each day welding or cutting is performed.) Provide welding process to be used (5 days before start of welding for KEH to furnish permit.) (each day for permit.) Permit shall be kept at worksite.

1.4.5 Oversize Load Permit: In addition to Washington State Permit, a site permit is required for each movement of oversize load or vehicle on established roads at Hanford Site. Permit will be furnished by KEH with 48 hour notice of the width, height and length of the oversized load and the proposed route of travel. The Contractor will be requested to verify the proposed route has been travelled and all limitations (especially, wire or signal height) have been identified. (See Section 01500 for vehicles requiring Oversize Load Permit, restrictions on movement, and other requirements.)

1.4.6 Tie-in Permit: All tie-ins to existing power, water alarm, or other site services require a tie-in permit. KEH requires 48 hours notice prior to need of permit.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

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SECTION 01200  
PROJECT MEETINGS

PART 1 - GENERAL

1.1 REFERENCES: Not Used

1.2 SUBMITTALS: Not Used

1.3 MEETING PROCEDURES

1.3.1 Representatives from KEH and the Contractor, including major subcontractors, shall participate in all project meetings. Representatives from Operating Contractor and DOE may attend as required by items to be discussed.

1.3.2 Meeting times and locations shall be mutually agreed to by Contractor and KEH and will be held at the Hanford Site in Richland, Washington, except informal design reviews. KEH will issue notices of meetings and prepare meeting minutes which will be distributed to project participants.

1.4 SITE LABOR CONFERENCE: Before starting construction onsite, Contractor shall attend an informational conference on Hanford Site labor requirements applicable to this project. KEH will notify the Contractor in advance that a meeting must be scheduled with representatives from labor organizations whose members may be utilized in construction. Contract General Conditions relating to labor will be reviewed.

1.5 PRECONSTRUCTION MEETING

1.5.1 Meeting will be scheduled by KEH before start of onsite work. Authorized representatives of Contractor and major subcontractors shall attend and KEH will advise others having an interest in the Work. Meeting will be chaired by KEH.

1.5.2 Following items, as a minimum, will be incorporated into agenda for meeting.

1.5.2.1 Point of contact and key personnel representing Operating Contractor, Security, Safety, QA/QC, Acceptance Inspectors, and Contract Administrators.

1.5.2.2 Schedule requirements and restraints, submittals, and work limitations.

1.5.2.3 Safety, Security construction progress meetings and frequency, and certified payrolls.

1.5.2.4 Report requirements and frequency.

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1.5.2.5 Quality requirements.

1.5.2.6 Major material and equipment lists.

1.5.2.7 Other pertinent items.

#### 1.6 CONSTRUCTION PROGRESS MEETINGS

1.6.1 Meetings held weekly at time and location determined at preconstruction conference will be approximately 1 hour long.

1.6.2 KEH will chair meeting and request attendance of key personnel as required. Authorized representative of Contractor and pertinent sub-contractors shall attend.

1.6.3 Purpose of meetings is to monitor status and provide forum for exchange of pertinent information related to the Work. Major topics may include, but not be limited to, the following.

1.6.3.1 Schedule, cost, and construction status.

1.6.3.2 Design and scope changes.

1.6.3.3 Submittal status, key material, and equipment delivery status.

1.6.3.4 Potential problem areas.

1.6.3.5 Inspection and testing status.

1.6.3.6 Action item status, goals for next meeting.

1.6.3.7 Other appropriate items.

1.6.4 Meeting minutes will be issued by KEH as promptly as possible following the meeting. Action items will be identified with assigned followup. Issues resolved will be reported in the minutes, as well as closed action items.

#### PART 2 - PRODUCTS

Not Used

#### PART 3 - EXECUTION

Not Used

END OF SECTION

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## SECTION 01300

### SUBMITTALS

#### 1.1 DESCRIPTION

1.1.1 This Section summarizes requirements for submittal of documents defined in Part 1 of each Section of the Specification and describes procedures for supplemental submittals.

#### 1.2 SUBMITTALS

1.2.1 Submittals listed in Part 1 of each Section require either review and approval or review for record.

1.2.1.1 Review and approval: Submittals shall have been approved and returned to Contractor before proceeding with procurement, fabrication, or construction.

a. Approved submittals are identified by submittal stamp with "Approved" or "Approved with Exception" box checked. "Approved" signifies general concurrence to achieve conformance with design concept of the Project and compliance with requirements of Contract Documents. "Approved with Exception" signifies general concurrence with noteworthy comments or clarifications. Approval of submittals does not relieve Contractor of responsibility for errors contained therein.

b. Submittal not approved is identified on submittal stamp as "Not Approved, Revise and Resubmit." Submittal is considered, by Architect-Engineer (A-E), to be technically deficient or incomplete and unacceptable. Resubmittal is required, hence fabrication, procurement, or performance of procedures shall not proceed.

1.2.1.2 Review for record: Contractor may proceed with procurement, fabrication, or construction, however, acceptance is contingent upon compliance with the Drawings and Specifications. Incomplete or inaccurate submittal data will be returned to Contractor with appropriate comments and items procured or work performed shall be corrected.

1.2.2 Supplemental Submittals: Submittals initiated by Contractor for consideration of "equal substitute" products or corrective procedures shall contain sufficient data for review and approval.

1.2.2.1 Equal substitute product submittals must contain outline dimensions, operating clearances, and sufficient engineering data to indicate substantial compliance with the Drawings and Specifications.

a. Identify each submittal by specification number, Section and Paragraph number; or referenced Drawing number and detail.

b. Improperly identified submittals will be returned without consideration.

### 1.3 SUBMITTAL PROCEDURES

1.3.1 Submittals are itemized in Article 1.4 and are identified by submittal number and title. Identify each submittal by Specification number and submittal number noted in schedule. Number of copies required for retention by A-E are shown in schedule. Additional copies required for Contractor uses must be added.

1.3.2 Contractor shall review submittals before forwarding data to A-E. Contractor shall sign data transmittal form showing submittal has been reviewed for compliance with Contract Documents. Contractor's signature represents he has verified materials and field measurements, and checked and coordinated information contained within submittals with requirements of Contract Documents. Only signed submittals shall be forwarded to A-E. Submittals not signed will be returned by A-E without review.

### 1.4 SCHEDULE OF SUBMITTALS

Submittal Reference	Submittal Title	Quantity	Review and Approval	Review For Record
CONTRACT GENERAL CONDITIONS 55/1	Safety Program; Industrial Injury/ Illness Experience; Equipment Certification	10	Prior to badging	
PROGRESS SCHEDULES				
01310/1.2.1	Progress Schedule	10	10 days after notice to proceed	
01310/1.2.2	Weekly Work Schedule	10	Weekly	
CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS				
01500/1.2.1	Anchoring and Enclosure Methods	10	Prior to mobilization	
FIRE WATER SYSTEMS				
02668/1.2.1	Approval Data	10	Before delivery	
02668/1.2.2	Certified Vendor Information (CVI)	12		Before installation
02668/1.2.3	NFPA Test Certificate	10		Within 10 days after completion

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<b>FIRE WATER SYSTEMS (Continued)</b>			
02668/1.2.4	Flushing Procedure	10	Prior to flushing
<b>CAST-IN-PLACE CONCRETE</b>			
03300/1.2.1	Certification of Ready Mixed Concrete Production Facilities	10	Before mixing
03300/1.2.2	Concrete Materials, Mix Design and Mix Proportions	10	Before mixing
<b>SEALANTS AND CAULKING</b>			
07920/1.2.1	Manufacturer's Installation Instructions	10	Before delivery
<b>METAL DOORS AND FRAMES</b>			
08100/1.2.1	Fabricator Drawings	10	Before delivery
<b>FINISH HARDWARE</b>			
08710/1.2.1	Hardware List	10	Concurrent with doors and frames
<b>SPECIAL PROTECTIVE COATING</b>			
09805/1.2.1	List of Materials	10	Before delivery
09805/1.2.2	Certificate of Compatibility	10	Before delivery
<b>FIRE PROTECTION</b>			
15300/1.2.1	Approval Data	10	Before delivery
15300/1.2.2	Certified Vendor Information (CVI)	12	Before installation
15300/1.2.3	Design/Fabricator Drawings	10	Before fabrication
15300/1.2.4	As-Built Drawings	10	Within 10 days after completion

ECN-29

Submittal Reference	Submittal Title	Quantity	Review and Approval	Review For Record
FIRE PROTECTION (Continued)				
15300/1.2.5	NFPA Test Certificate	10		Within 10 days after completion
HEATING, VENTILATING, AND AIR CONDITIONING				
15500/1.2.1	Certified Vendor Information (CVI)	12		Before installation
15500/1.2.2	Test and Balance Data	10		Within 10 days after test completion
SERVICE AND DISTRIBUTION (600-VOLT AND BELOW)				
16400/1.2.1	Approval Data	10	Before delivery	
ALARM AND DETECTION SYSTEMS				
16720/1.2.1	Approval Data	10	Before delivery	

END OF SECTION

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SECTION 01310

PROGRESS SCHEDULES

PART 1 - GENERAL

1.1 REFERENCES: Not Used

1.2 SUBMITTALS

1.2.1 Rate of Progress Schedule: Submit schedule as required in this Section.

1.2.2 Weekly Work Schedule: Submit schedule as required in this section.

1.3 RATE OF PROGRESS SCHEDULES

1.3.1 A progress schedule as identified in Section 5 of Contract General Conditions shall be submitted for approval, in accordance with the following.

1.3.1.1 If the duration of the Contract is 120 calendar days or less, the schedule shall be submitted within 10 calendar days after receipt of notice to proceed.

1.3.1.2 The progress schedule shall show the order in which the Contractor proposes to carry on the work, the dates on which it will start the several salient features of the work, including procurement of materials and equipment, and contemplated dates for completion. Each schedule shall be in the form of a horizontal bar chart of suitable scale to indicate the percentage of work scheduled for completion at any time with a separate bar for each activity. At the end of each week or at the end of such other periods of time specified in the Contract, the Contractor shall prepare and submit one copy of such chart showing the actual progress at the end of such period.

1.3.2 Organize the schedule to show activities relative to each major subcontractor and supplier. Provide sub-schedule to define critical portions of the entire schedule.

1.3.3 The progress schedule shall include design activities, milestones, and delivery date of design documents. Construction activities and progress milestones shall include, but not be limited to, the following activities.

1.3.3.1 General Project Activities

- a. Submittals.
- b. Mobilization.
- c. Fire sprinkler design.
- d. Grading, contouring, and roadway subgrade.

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- e. Underground FW mainline.
- f. Underground electrical and fire alarm.

#### 1.3.3.2 Activities Identifiable by Building.

- a. Fire riser room enclosure.
- b. Fans and louvers.
- c. General electrical conduit, wire and termination.
- d. Fire alarm conduit, wire, termination.
- e. Fire sprinkler system.
- f. CAM installation.
- g. Special protective coating.
- h. Testing.
- i. ATP.

1.3.4 The schedule shall show, as a minimum, the accumulated percentage of completion of each activity and total percentage of work completed as of the last workday of each month.

a. An "S" curve shall be developed from percentage of total work figures and superimposed on the Progress Schedule.

b. A dollar value or percent of total shall be shown next to each activity shown on the schedule. These figures will be the basis for determining the progress payments described in Section 01027.

#### 1.4 WEEKLY WORK SCHEDULE

1.4.1 The Contractor shall prepare and submit 2 copies of a detailed schedule of the next week's work (no later than noon of each Friday). The first weekly work schedule shall be submitted within 10 working days after receipt of the written notice of Contract award for review and approval. The schedule shall include the following as a minimum.

- a. Work description.
- b. Location of work.
- c. Work involving outages, overtime, weekends, etc.

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1.5 REVISIONS TO SCHEDULES

1.5.1 Whenever KEH determines that there is a significant variance between actual and scheduled progress, endangering completion within the Contract completion time, he may require the Contractor to prepare and submit a revised progress schedule.

1.5.2 Indicate progress of each activity to date of submittal and projected completion date of each activity. Identify activities modified since previous submittal, major changes in scope, and other identifiable changes.

1.5.3 Provide narrative report to define problem areas, anticipated delays, and impact on schedule. Report corrective action taken, or proposed, and its effect, including the effect of changes on schedules of separate contractors.

1.5.4 Distribute copies of revised schedules to jobsite file, subcontractors, suppliers, and other concerned entities. Instruct recipients to promptly report, in writing, problems anticipated by projections shown in revised schedules.

1.5.5 If the Contractor fails to submit the progress schedule specified in Paragraph 1.3.1, within the time prescribed, or the updated progress schedule specified in Paragraph 1.5.1, within the requested time, KEH may withhold approval of progress payments until such time as the Contractor submits the required progress schedules.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

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SECTION 01400  
QUALITY ASSURANCE

PART 1 - GENERAL

1.1 REFERENCES: Not Used

1.2 SUBMITTALS: Not Used

1.3 INSPECTION AND TESTING

1.3.1 Performance by Contractor

1.3.1.1 Inspection and testing to be performed by the Contractor shall be as stated in Section 19 of Contract General Conditions and including, but not limited to, the following specific inspection activities:

- a. Concrete preplacement, placement, curing (pour slip).
- b. Fire water system hydrostatic testing.
- c. Fire protection hydrostatic testing.
- d. HVAC test and balance.
- e. Electrical testing.
- f. Alarm and detection system testing.
- g. ATP.

1.3.2 Performed by KEH: In accordance with Section 19 of Contract General Conditions, KEH or its designated representative will perform inspections and tests as follows:

- a. Specific inspection points.
- b. Final Acceptance Inspection.
- c. Testing to determine moisture-density relations and field in-place density of soils.
- d. Preparation, collecting, and testing of concrete and grout test specimens.
- e. SPC testing.

1.3.3 Specific Inspection Points

1.3.3.1 The Contractor shall adhere to inspection points specified. Contractor shall assure their personnel have completed inspections of and approved portions of work in accordance with Contract requirements before notifying KEH.

a. Specific inspection points are defined as follows:

1) Construction inspection (H): Required for witnessing of specific construction features before further construction is allowed to proceed.

2) Witness (W): Selected for inspection at option of KEH. Work may proceed upon verbal release by KEH or upon the expiration of 1 hour beyond the scheduled time of the witness.

b. Specific Inspection Points: Apply to onsite work. Except where a longer notification period is specified, the Contractor shall notify KEH not less than 4 working hours prior to each inspection for onsite work.

1.3.3.2 The Inspection Points: Construction Inspection (H) and Witness (W) for the contract work will be for the following items and stages of work:

a. Sitework

1) Earthwork

- H - All compaction procedure demonstration (requires 3 working days notice)
- H - All backfilling operations

2) Fire water system

- R - Arrival of PIV and post indicator and hydrant at jobsite
- W - Initial installation of piping
- H - All flushing of piping
- H - All pressure testing of piping
- H - Tie-in to existing system

b. Concrete

1) Cast-in-place concrete

- H - All placement of concrete
- H - All placement of grout

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c. Metal

1) Metal fabrication

W - Initial welding

d. Thermal and moisture protection

1) Insulation

W - Initial installation of wall and ceiling insulation

2)---~~Sealant and caulking~~

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H---~~Initial installation~~

ECN-29

e. Finishes

1) Special protective coating

H - Prior to application of each coating

f. Mechanical

1) Fire protection

W - Initial welding

H - All flushing of piping

H - All pressure testing of piping

W - Initial packing of pipe penetrations

2)---HVAC

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H---~~All testing and balancing HVAC system~~

ECN-31

g. Electrical

1) Service and distribution

W - ~~All continuity testing~~

*All electrical testing of equipment and wiring for 150 volts and below.*

H - Final Closure of electrical enclosures

WH - All electrical testing of equipment and wiring for above 150 volts and below

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2) Alarm and detection systems

W - All continuity testing

H - All performance of ATP

#### 1.4 OPEN ITEM DEFICIENCY AND NONCONFORMANCE REPORTING

1.4.1 KEH utilizes open item deficiencies and nonconformance reports to document deviations from Contract requirements.

1.4.1.1 Open Item Deficiency: Documented on Open Items Lists available from KEH on request. Can be corrected by Contractor without additional direction. The correction must bring item into compliance with Contract requirements, using approved rework procedures or standards without violating applicable specifications, codes, or standards.

1.4.1.2 Nonconformance Report: Documented on Construction Nonconformance Report (NCR). NCRs document deviations from Contract requirements when characteristic, documentation or procedure renders the quality of an item or activity unacceptable or indeterminate. May be identified by a blue NCR tag or red construction hold tag. A hold tag prohibits movement, installation, processing or further fabrication of the nonconforming item pending approval of NCR disposition. An NCR tag identifies a nonconformance but does not preclude movement, installation, processing or further fabrication of the item. No action may be taken to correct or alter the actual condition prior to receipt of an approved disposition. Tags are not to be removed by anyone other than agency who applied tag.

1.4.2 Contractor shall ensure its organization is represented by individuals with sufficient authority to commit Contractor to Corrective Action Requests identified by KEH.

1.4.3 Open Item deficiencies and nonconformances reported during performance of Contract require resolution before completion and final payment.

#### PART 2 - PRODUCTS

Not Used

#### PART 3 - EXECUTION

Not Used

END OF SECTION

SECTION 01500

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 - GENERAL

1.1 REFERENCES

1.1.1 National Fire Protection Association (NFPA)

NFPA 701-1977

Standard Method of Fire Tests  
for Flame-Resistant Textiles  
and Films

1.1.2 Washington State Department of Transportation (WSDOT)

M41-10-88

Standard Specification for  
Road, Bridge, and Municipal  
Construction

1.2 SUBMITTALS: Refer to Section 01300 for procedures.

1.2.1 Anchoring and Enclosure Methods: Submit for review and approval, the methods proposed for anchoring portable structures and enclosing the underfloor area to meet the requirements of this Section.

1.3 CONSTRUCTION FACILITIES

1.3.1 First Aid: Facilities are available at the 2719WA Building in the 200-West Area to provide first line medical attention.

1.3.2 Operation and Storage Areas: The onsite operations of the Contractor including storage of materials shall be confined to area adjacent to the worksite as designated in the field by the KEH representative.

1.3.3 Disposal Site for Waste: Disposal of excess excavation, waste material, broken asphalt, and broken concrete shall be at a site approximately 12 road miles from the project location. The disposal site is open only during regular working hours as stated in these Contract Documents. The disposal site will not accept waste classified as hazardous material.

1.4 TEMPORARY UTILITIES

1.4.1 Water

1.4.1.1 Construction water: Water will be made available from an existing hydrant in the vicinity of the worksite. A 4-1/2 inch, National Standard Thread, 1/4 turn ball valve with a female swivel to a 4-inch sexless "Snap-Tite/Storz" quick connect coupling shall be connected to the 4-1/2 inch port for Fire Department use only. A reduced pressure backflow preventer, BEECO-AERGAP Model 6CM or approved, and a slow-opening 2-1/2 inch gate valve shall

be installed on each hydrant port intended for construction use. A slow-opening valve will prevent water hammer. The hydrant wrench, backflow preventers, and all valves shall be furnished by the Contractor. The wrench shall remain on the hydrant at all times. When used, the hydrant shall be turned "Full-on" or "Full-off." Partial opening causes damage to the hydrant. The hydrant shall be turned off at the end of each workday. The Contractor shall provide freeze protection for the hydrant and temporary piping or hoses. All temporary pipe or hose extensions shall be furnished by the Contractor. Fittings provided by the Contractor for connection to water source shall be approved by KEH prior to installation. Before final acceptance of the contract work, the Contractor shall remove all temporary piping, hoses, and valves installed by him.

**NOTE:** Contractor is required to notify KEH prior to each opening of hydrant.

1.4.1.2 Drinking Water: Water for drinking purposes will be made available within the 200-West Area. The Contractor is responsible for furnishing adequate drinking water to his employees that conforms to health and safety requirements.

1.4.2 Electrical Power: The Contractor shall provide his own temporary power. As an option, temporary power shall be provided from an existing breaker at the RMW Storage Facilities pad-mounted transformer. The contractor will provide all necessary materials to connect temporary power. The installation shall include a ground fault circuit interrupter and conform to NEC requirements.

1.4.3 Telephone

1.4.3.1 The telephone system within the Administratively Controlled Area at the Hanford Site is operated by General Telephone Company of the Northwest, Inc. Upon request of the Contractor, KEH will arrange for telephone service at the construction offices of the Contractor and its subcontractors, if facilities for such services are available. KEH will charge the Contractor for installation and services in accordance with the charge assessed by General Telephone Company. Those charges will be determined on the basis of published tariffs. Information of tariffs may be obtained from DOE's Site Services Contractor, office of the Manager of the Plant Telephone and Radio, Telephone 376-6322.

1.4.3.2 All of the above charges will be deducted from payments due the Contractor. The Contractor and its subcontractors may use provided telephones for long distance calls necessary to the performance of the work. All such calls must be made by use of a valid credit card and the cost of such calls shall not be charged to the Site Services Contractor or KEH.

1.4.4 Sanitary Facilities: The Contractor shall furnish and service chemical or other approved sanitary toilets for use of his employees. The facilities shall conform to requirements of KEH which are available upon request.

1.5 ACCESS ROADS AND PARKING AREAS

1.5.1 Access to 200-West Area shall be through the main gate.

1.5.2 Parking for Contractor's Company vehicles will be made available in the vicinity of the worksite. "No Parking" signs are posted to indicate fire and emergency lanes. No on-street parking will be allowed nor will parking be permitted on the RMW Storage Pads.

1.5.3 Grass Fire Prevention: To reduce the potential for grass fires, all off-road driving shall be kept to a minimum. Each vehicle driving off-road or to remote locations shall carry a portable fire extinguisher (10 pound ABC dry chemical, minimum), communications equipment consisting of a 2-way radio or mobile phone (CB type radios are not acceptable), and a shovel. All fires shall be reported immediately to the nearest Hanford Patrol and the Hanford Fire Department.

1.6 TEMPORARY CONTROLS

1.6.1 Dust Control: The Contractor shall maintain all work areas to prevent a hazard or nuisance to others. Dust control shall be accomplished by sprinkling or other methods as approved by KEH. Sprinkling shall be repeated at such intervals to keep all parts of the disturbed area at least damp at all times, and the Contractor must have sufficient equipment on the job to accomplish this. Dust control shall be performed as the work proceeds and whenever a dust nuisance or hazard occurs. No separate or direct payment will be made for dust control and the cost thereof shall be considered incidental to and included in the contract price.

1.6.2 Temporary enclosures: Plastic sheeting materials used to form enclosures shall have minimum thickness of 14 mil and have fire retardant capabilities meeting the requirements of NFPA 701. Acceptable manufacturers are Winman Corporation (Plastic Division), St. Cloud, Minnesota; Lancs Industries, 1270 N.E. 124th Street, Kirkland, Washington 98034; and Protective Plastics, Inc. 230 Silver Creek Road, Greer, South Carolina 29651. Other manufacturers may be submitted to KEH for approval.

1.6.3 Traffic Control: Temporary traffic control and barricades shall be in accordance with WSDOT M41-10, Section 1-07.23(3).

1.6.3.1 Movement of Vehicles and Equipment: Slow moving vehicles and equipment shall not travel on Hanford Site roads during heavy traffic periods between 6:30 A.M. and 8:00 A.M., and 3:30 P.M. and 5:30 P.M. Vehicles and equipment shall not block existing roads or park on roadway shoulders.

1.6.3.2 Oversize Load or Vehicle: Travel of oversized load or vehicle is restricted to the hours between 9:00 A.M. and 2:30 P.M. Site permit specified

in Section 01065 is required when the load or vehicle exceeds the following dimensions:

- Width 8 feet 6 inches
- Height 14 feet
- Length 40 feet (Single unit)  
48 feet (Single trailing unit)

a. Oversized Load Identification: All vehicles or loads exceeding 8 feet 6 inches in width shall have an oversized load sign displayed on the front of the towing vehicle and on the rear of the trailing unit. Red flags shall be attached to each corner of the oversized load or vehicle.

b. Escort Vehicle(s): Escort vehicles shall be equipped with oversized load signs and amber lights. On two-lane highways, escort vehicles are required in the front and rear of a load or vehicle over 10 feet wide. For multiple-lane highways, an escort vehicle is required in the rear of a load or vehicle over 14 feet wide and on the front and rear of a load or vehicle over 20 feet wide.

c. Electrical Escort: A qualified electrical escort (journeyman lineman) is required when the load or vehicle reaches a height of 14 feet or higher from the road surface or when a clearance of at least 6 feet cannot be maintained from overhead electrical or signal lines.

#### 1.7 FIELD OFFICE

1.7.1 A field office equipped and staffed to conduct efficiently the work under this contract shall be established by the Contractor. A copy of all Drawings, Specifications, and other information pertinent to the proper and efficient prosecution of the contract work shall be kept at the worksite at all times, and the authorized representative of KEH shall have access thereto at all times. Telephone service will be made available at the Contractor's field office, as set forth in Paragraph 1.4.3. providing such service is available. The Contractor may utilize existing telephones at buildings to be designated in the field by KEH for local calls.

1.7.2 All portable or relocatable structures, including trailers utilized by Contractor for field offices and/or storage, shall be anchored or tied down to prevent overturning and/or lateral movement in winds up to 70 mph. The underfloor area shall be enclosed or skirted with material that will not burn or support combustion. The purpose of this requirement is for prevention of wind-blown debris accumulation and the use of underfloor space for material storage. Anchoring and enclosure shall be in accordance with anchoring and enclosure methods submitted and shall be completed within 14 days of arrival onsite.

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PART 2 - PRODUCTS

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PART 3 - EXECUTION

Not Used

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SECTION 01630

PRODUCT OPTION AND SUBSTITUTION

PART 1 - GENERAL

1.1 REFERENCES: Not Used

1.2 SUBMITTALS: Not Used

1.3 GENERAL

1.3.1 Products include material, equipment and systems, and shall meet the requirements of the specifications and referenced standards.

1.3.2 The material and workmanship shall meet requirements of Section 13 of the Contract General Conditions.

1.3.3 Components required to be supplied in quantity within a Specification section shall be the same and be interchangeable.

1.3.4 Do not use materials and equipment removed from existing structure, except as specifically required, or allowed, by Contract Documents.

1.4 PROCEDURES

1.4.1 The Contractor is not required to obtain approval of proposed product when the product is:

1.4.1.1 Specified by reference standards or by description and the proposed product meets those standards.

1.4.1.2 Specified by naming models of manufacturers and the product is one of those specifically named.

1.4.2 The Contractor is required to obtain approval of proposed product when the product is:

1.4.2.1 Specified by naming models of one or more manufacturers and the product is not one specifically named.

1.4.2.2 Not specified by manufacturer and the Specification requires specific product approval.

1.4.3 Products List

1.4.3.1 Within 10 days after date of Notice of Award transmit 5 copies of a list of major products which are proposed for installation, including name of manufacturer.

1.4.3.2 Tabulate products by Specification section number, title, and Article or Paragraph number.

1.4.3.3 For products specified only by reference standards, give manufacturer, trade name, model or catalog designation, and reference standards.

1.4.3.4 KEH will reply in writing within 10 days stating whether there is reasonable objection to listed items. Failure to object to a listed item will not constitute a waiver of specified requirements.

#### 1.4.4 Limitations on substitutions

1.4.4.1 Substitutions will not be considered when indicated or implied on fabricator drawings or product data submittals without separate formal request, when requested directly by subcontractor or supplier, or when acceptance will require substantial revision of Contract Documents.

1.4.4.2 Substitute products shall not be ordered or installed without written acceptance.

1.4.4.3 Only 1 request for substitution for each product will be considered. When substitution is not accepted, provide specified product.

1.4.4.4 KEH will determine acceptability of substitutions.

#### 1.4.5 Requests for substitutions

1.4.5.1 Submit separate request for each substitution using form KEH 1151.00 (sample attached). Document each request with complete data substantiating compliance of proposed substitution with requirements of Contract Documents.

1.4.5.2 Identify product by Specification Section and Article or Paragraph numbers. Provide manufacturer's name and address, trade name of product, and model or catalog number. List fabricators and suppliers as appropriate.

1.4.5.3 Attach as a minimum product data as specified in Section 13 of Contract General Conditions.

1.4.5.4 Give itemized comparison of proposed substitution with specified product, listing variations, and reference to Specifications Section and Article or Paragraph numbers.

1.4.5.5 Give quality and performance comparison between proposed substitution and the specified product.

1.4.5.6 Give cost data comparing proposed substitution with specified product and amount of net change to Contract Sum.

1.4.5.7 List availability of maintenance services and replacement materials.

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1.4.5.8 State effect of substitution on construction schedule and changes required in other work or products. If substituted product requires or necessitates revisions to structures, foundations, footings, services, systems, piping, electrical, etc; the cost of all engineering and construction shall be borne by the Contractor. The Contractor shall submit for approval all drawings, calculations, and vendor data which clearly indicate revisions to accommodate the substitution.

#### 1.4.6 Contract representation

1.4.6.1 Request for substitution constitutes a representation that Contractor has investigated proposed product and has determined that it is equal to or superior in all respects to specified product (or that the cost reduction offered is ample justification for accepting the offered substitution).

1.4.6.2 Contractor shall provide same warranty for substitution as for specified product.

1.4.6.3 Contractor shall coordinate installation of accepted substitute, making such changes as may be required for work to be completed in all respects.

1.4.6.4 Contractor certifies that cost data presented is complete and includes all related costs under this contract.

1.4.6.5 Contractor waives claims for additional costs related to substitution which may later become apparent.

1.4.6.6 Contractor waives claims for additional performance time resulting from product substitution.

#### 1.4.7 Submittal

1.4.7.1 Submit 5 copies of request for substitution.

1.4.7.2 KEH will review Contractor's request for substitutions with reasonable promptness.

1.4.7.3 For accepted products, submit fabricator drawings, product data, and samples as required in Section 01300.

#### PART 2 - PRODUCTS

Not Used

#### PART 3 - EXECUTION

Not Used

From (Contractor) \_\_\_\_\_ Contract No. \_\_\_\_\_

Project \_\_\_\_\_

Description of Proposed Substitution \_\_\_\_\_

We hereby submit for consideration the following product instead of specified item for above project:

Specification No. \_\_\_\_\_ Section \_\_\_\_\_

Drawing No. \_\_\_\_\_ Section or Zone \_\_\_\_\_

Specified Item \_\_\_\_\_

Proposed Substitution \_\_\_\_\_

Attach complete technical data, including laboratory tests and samples, as applicable.

Provide detailed comparison of the significant qualities (system performance, interface requirements, size weight, durability, performance and similar characteristics, and including visual effect where applicable) for the proposed substitution of comparison with the original requirements.

Describe other changes to drawings and specifications required by proposal as outlined below and attach additional information as necessary.

Complete Each Item

A. Changes to drawing dimensions \_\_\_\_\_

B. Effect of substitution on other systems \_\_\_\_\_

C. Outline differences between proposed substitution and specified item \_\_\_\_\_

D. Manufacturer's guarantees of proposed and specified items are:

\_\_\_\_\_ Same \_\_\_\_\_ Different (explain on attachment)

Undersigned attests function, and quality equality equivalent or superior to specified item and has reviewed General Conditions paragraph GC-13 for assignment of responsibility if the substitution is approved.

Submitted By

Signature

Address

Date

Phone

END OF SECTION

SECTION 01720

PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 REFERENCES: Not Used

1.2 SUBMITTALS: Not Used

1.3 RECORD REQUIREMENTS

1.3.1 The nature of the work at the Hanford Site requires that certain documents, as defined herein, be held to record the construction process and the administration of the Contract. KEH is responsible for assembling all pertinent data for final disposition. The Contractor is responsible for preparing, preserving, and delivering those Project Record Documents to KEH required by this Contract. These documents are in addition to those submittals required in Section 01300.

1.3.2 Project Record Documents shall be marked by the Contractor to identify those copies for record and to prevent their use for construction. Record copies of construction documents shall be kept in the Contractor's Field Office and shall be available to KEH during the progress of the work.

1.3.3 Some data required for Project Records are delivered to KEH during the course of construction and contract administration, while other required records are assembled after completion of construction for delivery to KEH. In all situations the Contractor is required to document the delivery by retaining a copy of reports delivered during course of work until construction completion, retaining a copy of letter of transmittal itemizing delivered items, or other means acceptable to KEH.

1.4 PROJECT RECORD DOCUMENTS

1.4.1 General: The documents required for Project Record are itemized herein. Each document shall be identified by Title or Number and shall be complete. All notes or markings added by hand shall be legible, utilizing a permanent, nonsmearing marking media, such as ink or felt tip markers, in contrasting color.

1.4.2 Contract Documents: One set of Drawings and the Contract Documents, including Addenda and Modifications to the Contract, shall be stored in the Field Office apart from documents used in construction and shall be maintained in a clean, dry, and legible condition. Legibly mark each item to record actual construction, including changes to dimensions and details, manufacturer's name, catalog number, and substitute products.

1.4.3 Certified Payrolls: Each week certified payrolls, as required by Section 108 of the Contract General Conditions, shall be filed with KEH and copies kept in Field Office until Contract completion. No progress payments

will be processed unless all certified payrolls for the work period have been received by KEH.

1.4.4 Weekly Manpower Report: A weekly manpower report completed daily and submitted weekly (before 10:00 a.m. on Monday for the previous week) is required during the performance period of subject contract. Forms for Contractor's use in documenting the foregoing will be furnished by KEH.

1.4.5 Backfill Permit: Retain all backfill permits approved for the work as required in Section 02200.

1.4.6 Soil Compaction Procedure: Retain all Forms KEH-382 completed for the work as required in Section 02200.

1.4.7 Pour Slips: After obtaining KEH approval of concrete pour slip required in Section 03300, give copy to KEH and retain Contractor copy until Contract closeout to forward to KEH.

1.4.8 Trip Tickets: Deliver to KEH with each truckload of concrete as required in Section 03300 and retain Contractor copy until Contract closeout and forward to KEH.

1.4.9 Concrete Tests: If the Contractor elects to test concrete or to have independent tests performed, copies of such tests shall be given to KEH.

1.4.10 Product Samples and Manufacturer's Instructions: In addition to submittal required in Section 01300 and requirements of this Section, any information received by the Contractor from suppliers that can document products used and how they were installed shall be forwarded to KEH for Project Records.

1.4.11 Electrical Reports: Delivery to KEH weekly as completed in accordance with Section 16400.

ECN-10

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

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SECTION 02200

EARTHWORK

PART 1 - GENERAL

1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

1.1.1.1 American Society for Testing and Materials (ASTM)

D 653-87

Standard Terminology Relating  
to Soil, Rock, and Contained  
Fluids

1.1.1.2 Washington State Department of Transportation (WSDOT)

M41-10-88

Standard Specifications for  
Road, Bridge, and Municipal  
Construction

1.2 SUBMITTALS: Refer to Section 01300 for submittal procedures.

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 General: Obtain select soils from excavation or other designated locations. Obtain onsite approval for soils.

2.1.2 Fill or Backfill

2.1.2.1 Structural: Well graded soil mixtures which may contain cobbles up to 3 inches in greatest dimension if uniformly distributed and not constituting more than 20 percent of volume of fill.

2.1.3 Bedding for Underground Pipe, Conduit, and Cable: Sand, defined in ASTM D 653, or excavated sandy material having less than 20 percent gravel particles and maximum dimension of 1/2 inch.

2.1.4 Stabilization: Gravel, defined in ASTM D 653. Maximum-size-of particles - 3/4-inch-for-walkways-and-2-inch-minus-for-other-areas. Gravel shall meet the grading requirements of WSDOT M41-10, Section 9-03.1(3) C grading No. 2.

2.1.5 See page 02200 - 1a.

ECN-17

ECN-17

2.1.5 Plastic Sheet Marker: 6 inch wide nondetectable tape similar to "Terra Tape" manufactured by Griffolyn Co, Inc. Tape shall be imprinted with warning such as "Caution Buried Installation Below" at intervals of not more than 4 feet. Color code in accordance with the American Public Works Association uniform color code.

### PART 3 - EXECUTION

#### 3.1 EXCAVATION

3.1.1 Before performing excavation, obtain excavation permit. Excavation permits will be furnished as set forth in Section 01065.

3.1.2 Locate and expose underground utilities by hand tools. Use of heavy equipment and machinery is subject to approval of KEH.

3.1.3 Shore excavations more than 4 feet deep and with sides sloped steeper than 1-1/2 horizontal to 1 vertical. Install shoring as excavation progresses and remove as backfilling is accomplished.

3.1.4 Do not store excavated or other material closer than 2 feet from edge of excavation unless barrier is erected to retain excavated materials. Store and maintain materials in manner that they are prevented from falling or sliding into excavation.

3.1.5 Wherever slopes of excavations will intersect existing underground lines or structures such as building foundations, underground piping, electrical ducts or direct buried electrical lines, install shoring or other means of support to prevent overstressing existing structure or underground lines or to prevent interrupting service to existing buildings.

#### 3.1.6 Trenches for Underground Piping, Conduit, and Cable

3.1.6.1 Make excavations to line and grade shown on the Drawings and wide enough to make connections. Excavate with near vertical sides from bottom of trench up to 1 foot above utility lines. Excavate trench deep enough to permit placement of compacted sand bedding, 4 inch minimum thickness, beneath lines except where excavation is in undisturbed sand which will serve as bedding or where lines are to be encased in concrete. Pare holes in trench bottoms for pipe couplings so pipe will bear full length of barrel or section.

3.1.6.2 Make excavation for piping, conduit, or cable only after subgrade is achieved and prior to placement of stabilization or granular base.

3.1.6.3 Install shoring to hold materials and surcharge pressure for full depth of trench.

3.1.6.4 Keep trenches free of standing water when laying is in progress.

3.1.6.5 If over-excavation occurs, correct by placement of structural backfill.

3.1.7 Where stabilization is required, finish subgrade 3 inches below elevations shown on the Drawings.

3.1.8 Where roadways are shown on Drawing, finish subgrade 6 inches below elevation shown on Drawing, refer to section 02235.

### 3.2 INSTALLATION

#### 3.2.1 Fill and Backfill

##### 3.2.1.1 General

a. Backfill Permit: Do not start fill or backfill without approved permit as set forth in Section 01065.

b. Remove debris and organic matter from area to be filled or backfilled.

c. Use only select materials for fill or backfill. Keep materials free of frozen particles, lumps, organic matter, and trash.

d. Do not place fill or backfill on frozen ground.

e. Filling or backfilling by sluicing or flooding with water will not be permitted.

f. Bring fill or backfill up evenly on sides of walls, structures and utility lines to avoid unbalanced loading.

g. Do not place fill or backfill against concrete structure or foundation wall less than 14 days after completion of structure or wall unless written permission from KEH is obtained. Provide wall support, where noted on the Drawings, before filling or backfilling.

##### 3.2.1.2 Structural

a. Before placement of fill or backfill, demonstrate to KEH by physical test at site that procedure proposed for installation and compaction of soils will provide degree of compaction specified. Prepare "Soil Compaction Procedure" Form KEH-382, sample appended, in accordance with printed instructions. Forms will be furnished by KEH.

b. Place backfill in accordance with WSDOT M41-10, Section 2-03.3(14)C, Method B, and approved procedure.

##### 3.2.1.3 Underground piping, conduit, and cable trenches

a. Bedding placed beneath utility lines in trenches shall be material meeting the requirements of Paragraph 2.1.3.

b. Place and compact bedding in trench prepared according to subparagraph 3.1.6.1 before laying utility lines. Compact bedding as specified for structural backfill.

c. Place backfill over joints in underground pipes only after pressure testing of line has been completed.

d. Backfill under conduit and haunches of pipe, around sides, and up to 1 foot above top of pipe or conduit with bedding material. Place and compact material same as specified for structural backfill. Compact with care, to avoid misalignment of pipe and provide uniform bearing along barrel of pipe.

e. Backfill utility trenches from elevation 1 foot above top of pipe using structural backfill.

f. Do not allow heavy construction equipment to pass over buried lines until at least 2 feet of backfill has been placed over line or until bridging has been placed across trenching and approved by KEH.

3.2.2 Plastic Sheet Marker: Place continuous over buried utility lines. Place marker tape directly over line and 1 foot below finish grade. Place marker over each outside pipe of multiple lines. Place intermediate markers at maximum of 4 feet apart.

### 3.2.3 Finish Grading and Stabilization

3.2.3.1 Rake area disturbed by work, remove surface stones larger than 6 inches and dispose of excess material and debris at area designated by KEH.

3.2.3.2 Stabilize area disturbed by work with 3 inch course of gravel meeting the requirements of Paragraph 2.1.4. Finish stabilization course to elevations shown on the Drawings.

### 3.3 FIELD QUALITY CONTROL

3.3.1 Soil Compaction Tests: Sampling and testing of compacted fill and backfill will be performed by KEH. Compaction control tests will be in accordance with WSDOT M41-10, Section 2-03.3(14)D.



## INSTRUCTIONS

This Soil Compaction Procedure form, when approved by the Government Representative, constitutes an approved compaction procedure.

Section A is the responsibility of the Construction Contractor. It is to be completed at the time of backfill compaction demonstration and presented to the Government Representative.

Section B is completed by the Government Representative. Data entered is obtained from the agency that performs the laboratory testing.

Section C is completed by the Government Representative as the demonstration is performed. Using the applicable formula, the percent compaction achieved is determined and entered. Acceptance is based on the results as compared with the compaction percent required in Section A.

Section D is signed and dated by the Construction Contractor Representative acknowledging responsibility for this procedure and compliance thereto for applicable backfill operations. Section D is signed and dated by the Government Representative to signify approval.

END OF SECTION

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SECTION 02235

ROAD SUBGRADE AND GRANULAR BASE

PART 1 - GENERAL

1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

1.1.1.1 Washington State Department of Transportation (WSDOT)

M41-10-88

Standard Specification for  
Road, Bridge, and Municipal  
Construction

1.2 SUBMITTALS: Refer to Section 01300 for submittal procedures.

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 Subgrade Fill and Backfill

2.1.1.1 General: Obtain select soils from excavation or other designated locations. Obtain onsite approval for soils.

2.1.1.2 Fill or backfill: Well graded soil mixtures which may contain cobbles up to 3 inches in greatest dimension if uniformly distributed and not constituting more than 20 percent of volume of fill.

2.1.2 Granular Base

2.1.2.1 Leveling course: Meeting the requirements of WSDOT M41-10, Section 9-03.9(3), Top Course Classification.

2.1.2.2 Crushed gravel shoulder: Same as leveling course.

PART 3 - EXECUTION

3.1 EXCAVATION

3.1.1 Before performing excavation, obtain excavation permit. Excavation permits will be furnished as set forth in Section 01065.

3.1.2 If over-excavation occurs, correct by placement of backfill.

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3.2 INSTALLATION

3.2.1 Subgrade Filling and Backfilling

3.2.1.1 Remove debris and organic matter from area to be filled or backfilled.

3.2.1.2 Use only select materials for fill or backfill. Keep materials free of frozen particles, lumps, organic matter, and trash.

3.2.1.3 Do not place fill or backfill on frozen ground.

3.2.1.4 Filling or backfilling by sluicing or flooding with water will not be permitted.

3.2.2 Fill or Backfill

3.2.2.1 Before placement of fill or backfill, demonstrate, to KEH by physical test at site, that procedure proposed for installation and compaction of soils will provide degree of compaction specified. Prepare "Soil Compaction Procedure" Form KEH-382, sample appended, in accordance with printed instructions. Forms will be furnished by KEH.

3.2.2.2 Place backfill under roads in accordance with WSDOT M41-10, Section 2-03.3(14)C, Method B and approved procedure.

3.2.3 Granular Base

3.2.3.1 Before placement of granular base, demonstrate, to KEH by physical test at site, that procedure proposed for installation and compaction of base will provide degree of compaction specified. Prepare "Soil Compaction Procedure" Form KEH-382, sample appended, in accordance with printed instructions. Forms will be furnished by KEH.

3.2.3.2 Construction Requirements: Construction shall be in accordance with following sections of WSDOT M41-10.

- a. Subgrade: Section 2-06.3.
- b. Equipment: Section 4-04.3(1).
- c. Mixing: Section 4-04.3(3).
- d. Placing and spreading: Section 4-04.3(4).
- e. Miscellaneous requirements: Section 4-04.3(7).
- f. Weather limitations: Section 4-04.3(8).
- g. Hauling: Section 4-04.3(9).

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3.2.3.3 Shaping and Compacting: Final shaping before compacting shall be accomplished using approved equipment.

3.2.3.4 . Shoulders: Construct shoulders, of width shown on the Drawings, after placement of asphaltic wearing course.

3.2.4 Finish Grading and Stabilization: Rake area disturbed by work, remove surface stones larger than 6 inches and dispose of excess material and debris at area designated by KEH.

### 3.3 TESTING

3.3.1 Sampling and testing will be performed by KEH. Compaction control tests will be in accordance with WSDOT M41-10, Section 2-03.3(14)D.

# SOIL COMPACTION PROCEDURE

<b>A</b>	Project No.	Project Title			Date		
	Contract No.	Procedure No.	Location of Demonstration				
	REQUIREMENTS			EQUIPMENT DEMONSTRATED			
	Applicable Spec./Dwg.			Type			
	Compaction Required %			Manufacturer			
	Maximum Lift Size			Model			
<b>B</b>	LABORATORY SOIL TEST RESULTS						
	<input type="checkbox"/> Non-granular Materials (WSDOT Test Method No. 609)			<input type="checkbox"/> Granular Materials (WSDOT Test Method No. 606-A)			
<b>C</b>	COMPACTION DEMONSTRATION TEST RESULTS						
	Formula for Percent Compaction: $\frac{\text{dry density}}{\text{max density}} \times 100 = \text{Percent Compaction}$						
	No. of Passes	Depth of Lift	Percent Moisture	Lbs/ft <sup>3</sup> Dry	Maximum Density	Percent Compaction	Accept      Reject
Observations or Comments							
TEST METHOD USED FOR DEMONSTRATION <input type="checkbox"/> Nuclear Gage (ASTM D2922 & D3017) <input type="checkbox"/> Sand Cone (ASTM D1556) <input type="checkbox"/> Other _____ Apparatus No. _____							
<b>D</b>	Contractor Representative					Date	
	Government Representative					Date	

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**" INSTRUCTIONS**

This Soil Compaction Procedure form, when approved by the Government Representative, constitutes an approved compaction procedure.

Section A is the responsibility of the Construction Contractor. It is to be completed at the time of backfill compaction demonstration and presented to the Government Representative.

Section B is completed by the Government Representative. Data entered is obtained from the agency that performs the laboratory testing.

Section C is completed by the Government Representative as the demonstration is performed. Using the applicable formula, the percent compaction achieved is determined and entered. Acceptance is based on the results as compared with the compaction percent required in Section A.

Section D is signed and dated by the Construction Contractor Representative acknowledging responsibility for this procedure and compliance thereto for applicable backfill operations. Section D is signed and dated by the Government Representative to signify approval.

END OF SECTION

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SECTION 02668  
FIRE WATER SYSTEMS

PART 1 - GENERAL

1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

1.1.1.1 American National Standards Institute (ANSI)

ANSI Z53.1-1979	American National Standard Safety Color Code for Marking Physical Hazards
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1.1.1.2 American Water Works Association (AWWA)

C104-85	American National Standard for Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water
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C110-82	American National Standard for Ductile-Iron and Gray-Iron Fittings, 3 in. Through 48 in., for Water and Other Liquids
---------	--

C111-85	American National Standard for Rubber-Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings
---------	--

C151-86	American National Standard for Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds, for Water or Other Liquids
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C 500-86	AWWA Standard for Gate Valves for Water and Sewerage Systems
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C 502-85	AWWA Standard for Dry-Barrel Fire Hydrants
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- C600-82 AWWA Standard for Installation of Ductile-Iron Water Mains and Their Appurtenances
  - C651-86 AWWA Standard for Disinfecting Water Mains
  - 1.1.1.3 Factory Mutual System (FM)
    - 1988 Edition Approval Guide
  - 1.1.1.4 Federal Specifications (FS)
    - TT-E-489G Enamel, Alkyd, Gloss (For Exterior And Interior Surfaces)
    - TT-P-645A Primer, Paint, Zinc Chromate, Alkyd Type
  - 1.1.1.5 National Fire Protection Association (NFPA)
    - NFPA 24-1987 Standard for the Installation of Private Fire Service Mains and Their Appurtenances
    - NFPA 1963 Standard for Screw Threads and Gaskets for Fire Hose Connections, 1985 Edition
  - 1.1.1.6 Underwriters Laboratories, Inc (UL)
    - January 1988 Fire Protection Equipment Directory
  - 1.2 SUBMITTALS: Refer to Section 01300 for submittal procedures.
    - 1.2.1 Approval Data: Submit information listed in Column 5 of Vendor Data List in this Section.
    - 1.2.2 Certified Vendor Information (CVI): Submit information listed in Column 6 of Vendor Data List in this Section.
    - 1.2.3 NFPA Test Certificate: Submit completed Contractor's Material and Test Certificate in accordance with NFPA 24, Section 8-9.
    - 1.2.4 Flushing Procedure: Submit written procedure to identify flushing method to be used to achieve the flowrates required by NFPA 24. Procedure shall address methods of flow measurement and disposal of flushing water.



PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 General

2.1.1.1 Components of new underground fire protection system, if not designated in this Section and the Drawings by manufacturer's name and model or figure number, shall be current products of manufacturer and be listed or approved for intended use by UL or FM.

2.1.1.2 System is designed for maximum operating pressure of 125 psig.

2.1.2 Piping

2.1.2.1 Pipe, pipe joints, and fittings shall meet the requirements of NFPA 24, the Drawings, and this Section.

2.1.2.2 Pipe: Cement lined, meeting the requirements of AWWA C104 and ductile iron, Class 50 (minimum), meeting the requirements of AWWA C151. Pipe shall have rubber gasketed mechanical joints or push-on joints meeting the requirements of AWWA C111.

2.1.2.3 Fittings: Cement lined, meeting the requirements of AWWA C104 with joints and pressure class ratings compatible with pipe used and shall meet the requirements of AWWA C110.

2.1.3 Post Indicator Valve (PIV)

2.1.3.1 Gate valve: Nonrising stem valve with indicator post flange. Valve shall open in counterclockwise direction.

2.1.3.2 Indicator post: Adjustable, telescoping barrel type with locking handle and clearly visible, position indicator sign plates, protected by nonbreakable plastic windows. Post shall be matched for assembly to gate valve.

2.1.3.3 Valve position supervisory limit switch for installation on post indicator valve: Tamperproof and designed for use intended. Switch shall be operated during first 2 revolutions of handle in closing direction.

2.1.4 Fire Hydrant: Meeting the requirements of AWWA C502, dry barrel type with compression type main valve which opens against pressure. Inlets shall be 6 inch with minimum 5 inch valve opening. Hydrants shall have one 4-1/2 inch pumper nozzle and two 2-1/2 inch hose nozzles, including caps and chains. Nozzle threads shall be National Standard Fire Hose Coupling Threads in accordance with NFPA 1963. Hydrant operating nut and cap nuts shall be National Standard Pentagon in accordance with AWWA C502 and open in counter-clockwise direction. Stem seals shall be O ring type.

2.1.5 Hydrant Connection Valve: 6 inch gate valve meeting the requirements of AWWA C500 and provided with adjustable cast iron valve box.

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2.1.6 Reflective Sheeting: 6 inch wide reflective sheeting for placement around fire hydrant body and 3 inch wide sheeting for placement around barricade posts for fire hydrant shall be Scotchlite No. 3270 silver "Wide-Angle Flat Top", adhesive coated.

2.1.7 Drainage Material for Fire Hydrant Base: 3/8 inch to 1 inch clean crushed rock or gravel.

2.1.8 Bitumastic: Koppers No. 550 or Superservice Black.

2.1.9 Painting Materials

2.1.9.1 Primer: FS TT-P-645, (alkyd type zinc chromate) National Lead No. 200-41.

2.1.9.2 Paint: FS TT-E-489, Class A, Composition G.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

3.1.1 Install piping and piping accessories in accordance with NFPA 24, AWWA C600, the Drawings, and this Section.

3.1.2 Protect pipe and fittings from impact shocks and dropping. Before laying, inspect pipe and discard damaged components. Remove damaged components from jobsite.

3.1.3 Keep piping systems clean during work. Once fabrication has started on length of pipe, plug or cap open ends of piping when installation is not in progress to prevent entry of dirt and other foreign material. Inner surfaces of pipe, valves, and fittings shall be smooth, clean, and free of sand, debris, and dirt when installed.

3.1.4 Where piping is laid in trench, trench shall be free of frost or frozen earth and standing water.

3.1.5 Install new fire mains minimum depth of 3'-6" from grade to top of pipe.

3.1.6 Install restraints on pipe and piping components in accordance with NFPA 24, Article 8-6 and A-8-6.2. Restraining mechanical joints as listed in UL Fire Protection Equipment Directory may be substituted for conventional anchoring. Where thrust blocks are used, make bearing area equal to area shown in Table 8-6.2.9 multiplied by a factor of 1.33.

3.1.7 Coat carbon steel accessories, which will be buried, such as tie-rods and clamps, with bitumastic. Allow time for bitumastic to dry before backfilling.

3.1.8 Install fire hydrants and hydrant connection valves in accordance with the Drawings and this Section.

3.1.9 Install post barricades around fire hydrants and post indicator valves in accordance with the Drawings and this Section.

3.1.10 Excavation, backfill, and grading work shall meet the requirements of Section 02200 as it applies.

3.1.11 Place drainage material at base of fire hydrant in accordance with AWWA C600, Section 3.7. Interface between drainage material and compacted earthfill shall be separated by layer of 30 pound roofing paper.

3.1.12 Fire hydrant base pad shall bear on undisturbed or compacted earth and be minimum 24 inch diameter or square by 4 inch thick precast concrete.

3.1.13 Centerline of fire hydrant pumper nozzle shall be between 18 and 22 inches above adjacent finished grade. Orient pumper nozzle toward roadway or street.

#### 3.1.14 Painting and Marking

3.1.14.1 Surface preparation, materials, and coating application of primer and paint shall be in accordance with Section 09900.

3.1.14.2 Paint entire fire hydrant with 1 coat of primer and 2 coats of yellow enamel.

3.1.14.3 Paint upper barrel of indicator post with 1 coat of primer and 2 coats of red enamel.

3.1.14.4 Paint entire length of each barricade post with primer and above ground portion with 2 coats of red enamel.

3.1.14.5 Colors: Defined in ANSI Z53.1.

3.1.14.6 Primer shall meet the requirements of FS TT-P-645, and enamel shall meet the requirements of FS TT-E-489.

3.1.14.7 After painting is completed, place 6 inch wide reflective band around body of fire hydrant immediately below pumper nozzle. Place 3 inch wide reflective bands around fire hydrant barricade posts as shown on the Drawing.

### 3.2 FIELD QUALITY CONTROL

#### 3.2.1 General

3.2.1.1 Furnish equipment and instruments required to perform flushing and testing.

3.2.1.2 Perform flushing and testing while witnessed by KEH.

3.2.1.3 Remove and replace or repair apparatus, material, or work which fails in flushing or testing operations and repeat operation.

3.2.1.4 Repair damage resulting from flushing or testing.

3.2.2 Flushing

3.2.2.1 Flush new piping in accordance with NFPA 24, Article 8-8.

3.2.2.2 Provide documented evidence that flushing has been accomplished in accordance with this Section. Document flushing on the contractor's material and test certificate.

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Project No. <b>W-033 through W-037</b>		<div style="text-align: center;"> <b>KAISER ENGINEERS</b>  <b>HANFORD</b>  <b>VENDOR DATA LIST</b>          ("X" Indicates Required Data)       </div>																						
Title <b>RMW Storage Facilities</b>																								
1  EPN Identification	2  Description	3  Reference Drawing	4  Specification Paragraph	5 Approval/Data										6 Certified Vendor Information (CVI)							7  Remarks			
				Dimensional Drawings	Equipment Weights	Specifications	Material Description	Performance Data	Circuit or Control Diagrams	Data Sheets	Illustrative Cuts	Installation Instructions	Dimensional Drawings	Equipment Weights	Specifications	Certified Test Data	Circuit or Control Diagram	Instructions				Spare Parts List		
1	Piping		2.1.2				X					X												
2	Fittings		2.1.2.3				X					X												
3	Post Indicator Valve (PIV)		2.1.3									X												
4	Supervisory Switch		2.1.3.3									X												
5	Fire Hydrant		2.1.4									X							X	X	X			
6	Gate Valve (Hydrant Maint)		2.1.5									X												

\* Submit for CVI same items submitted for approval as marked.

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SECTION 02720

STORM SEWAGE SYSTEMS

PART 1 - GENERAL

1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

1.1.1.1 Washington State Department of Transportation (WSDOT)

M41-10-88

Standard Specifications for  
Road, Bridge, and Municipal  
Construction

1.2 SUBMITTALS: Refer to Section 01300 for submittal procedures.

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 Storm Sewer Pipe and Coupling Bands

2.1.1.1 Steel: Meeting the requirements of WSDOT M41-10, Section 9-05.10 and 9-05.10 (1).

PART 3 - EXECUTION

3.1 INSTALLATION

3.1.1 Storm Sewers

3.1.1.1 Excavate and prepare trench in accordance with Section 02200.

3.1.1.2 Lay Pipe in accordance with WSDOT M41-10, Section 7-04.3(2)B. All joints shall be coupled and gasketed on factory prepared ends in accordance with pipe manufacturers recommendations.

3.1.1.3 Clear pipe of all objects that could plug the pipe. Leave all joints uncovered until inspected.

3.1.1.4 Backfill in accordance with Section 02200.

3.2 FIELD QUALITY CONTROL

3.2.1 Inspection: All pipe joints will be inspected by KEH.

END OF SECTION

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SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

1.1.1.1 American Concrete Institute (ACI)

ACI 301-84 (Revised 1985) Specifications for Structural Concrete for Buildings

ACI 305-77 Standard Specification for Hot Weather Concreting

ACI 306.1-87 Standard Specification for Cold Weather Concreting

1.1.1.2 American Society for Testing and Materials (ASTM)

A 615-87 Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement

C 33-86 Standard Specification for Concrete Aggregates

C 94-86b Standard Specification for Ready-Mixed Concrete

C 150-86 Standard Specification for Portland Cement

C 260-86 Standard Specification for Air-Entraining Admixtures for Concrete

1.1.1.3 National Ready Mixed Concrete Association (NRMCA)

January 1, 1976 Certification of Ready Mixed  
(Third Revision) Concrete Production Facilities

1.2 SUBMITTALS: Refer to Section 01300 for submittal procedures.

1.2.1 Certification of Ready Mixed Concrete Production Facilities: Submit current legible copy of "Certificate of Conformance for Concrete Production Facilities" issued by and bearing the seal of the National Ready

Mixed Concrete Association. Certificate shall contain signature and seal of registered Civil Engineer.

1.2.2 Concrete Materials, Mix Design, and Mix Proportions: Submit concrete materials, mix design, and mix proportions in accordance with ACI 301, Sections 3.8 and 16.7.3. Define each material to be used in concrete and state amount, by weight, to be utilized per cubic yard of plastic mix.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

#### 2.1.1 Concrete

2.1.1.1 Cement: ASTM C 150, Type II (Low Alkali)

2.1.1.2 Aggregates: ASTM C 33, maximum size 1-1/2 inch.

2.1.1.3 Air-entraining admixture: Meeting the requirements of ASTM C 260; Sika Chemical Company "SIKA AER"; Chem-Masters Corp "Adz-Air"; or Protex Industries "Protex".

#### 2.1.1.4 Properties

- a. Minimum allowable compressive strength: 3000 psi at 28 days.
- b. Slump: 4 inch maximum in accordance with ACI 301, Section 3.5.
- c. Air content: In accordance with ACI 301, Table 3.4.1.
- d. Proportions: In accordance with ACI 301, Sections 3.8 and 3.9.

2.1.1.5 Mixing: In accordance with ASTM C 94.

2.1.1.6 Delivery: In accordance with ASTM C 94.

#### 2.1.2 Reinforcing Steel

2.1.2.1 Steel bars: ASTM A 615, deformed, Grade 60.

2.1.2.3 Tie wire: Black annealed steel, 16 gauge minimum.

#### 2.1.3 Joint Materials

2.1.3.1 Expansion joint filler: See Section 07920.

2.1.3.2 Sealant: See Section 07920.

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2.1.4 Nonshrink Grout

2.1.4.1 Nonmetallic type: "Five Star Grout" by US Grout Corp; "Por-Rok" Anchoring Cement by Hallemite; or "Masterflow 713" by Master Builders.

2.1.5 Forms: Wood, steel, plywood, or Masonite Corporation "Concrete Form Presdwood" as required for various specified finishes.

PART.3 - EXECUTION

3.1 PREPARATION

3.1.1 Form Construction

3.1.1.1 Install formwork in accordance with ACI 301, Section 4.2. Interior shape and rigidity shall be such that finished concrete will meet the requirements of the Drawings within tolerances specified in ACI 301, Table 4.3.1.

3.1.1.2 Prepare form surfaces in accordance with ACI 301, Section 4.4.

3.1.1.3 Forms for surfaces which will be permanently concealed from view may be saturated with water before placing concrete instead of other treatment, except in freezing weather, forms shall be treated with oil or stearate.

3.1.1.4 Clean forms of foreign material before placing concrete.

3.2 INSTALLATION

3.2.1 Reinforcing Steel

3.2.1.1 Fabricate bars accurately to dimensions shown on Drawings, within tolerances shown in ACI 301, Section 5.4.

3.2.1.2 Place as shown on approved submittals within tolerances specified in ACI 301, Sections 5.4 and 5.5.

3.2.1.3 Tie to prevent displacement during placement of concrete.

3.2.1.4 Do not force into concrete after initial set has started.

3.2.1.5 Place with dimension of concrete protection equal to minimum given in ACI 301, Section 5.5, except where shown otherwise on the Drawings.

3.2.2 Concrete

3.2.2.1 Before ordering, obtain approval of required submittals.

3.2.2.2 Before batching, obtain approval of formwork and reinforcement by KEH.

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3.2.2.3 Before placing:

a. Obtain approval of "Pour Slip" by KEH. "Pour Slip" shall include appropriate reference to specific portion of structure to be placed, maximum size of coarse aggregate, design strength, admixture, and slump. "Pour Slip" forms can be obtained from KEH.

b. For each truckload, deliver "Trip Ticket" to KEH. "Trip Ticket" shall contain information listed in ASTM C 94, subparagraphs 16.1.1 through 16.1.10, and include water/cement ratio.

3.2.2.4 Place in accordance with ACI 301, Sections 8.1, 8.2, and 8.3. Do not drop (free fall) more than 5 feet. Insert vibrator, vertically if possible, into concrete and reach small distance into concrete in next lower layer. Do not insert vibrators into lower courses that have reached initial set. Take care to avoid allowing head of vibrator to come in contact with forms or embedded items.

3.2.2.5 Temper only as permitted in ACI 301, Section 7.5.

3.2.2.6 Place nonshrink grout where shown on the Drawings and in accordance with manufacturer's recommendations.

3.2.2.7 Weather conditions: Protect concrete during placement in accordance with ACI 301, Section 8.4. Cold weather concreting shall be in accordance with ACI 306. Hot weather concreting shall be in accordance with ACI 305.

3.2.2.8 Construction joints: Make in accordance with ACI 301, Section 6.1, and as detailed on the Drawings.

3.2.2.9 Embedded items: Install in accordance with ACI 301, Sections 6.4 and 6.5.

3.2.2.10 Expansion and control joints: Install in accordance with the Drawings.

3.2.2.11 Placing concrete against earth: Place on or against firm, damp surfaces free of frost, ice, and free water. Do not place until required compaction has been obtained. Dampen earth surfaces to receive fresh concrete.

3.2.2.12 Consolidation: Consolidate concrete slabs in accordance with ACI 301, Section 11.6.

3.2.3 Concrete Repair and Form Removal

3.2.3.1 Form removal: Remove in accordance with ACI 301, Section 4.5.

3.2.3.2 Cut back form ties and examine concrete surfaces for defects. Repair only after permission for patching is given by KEH.

3.2.3.3 Place concrete repair mortar within 1 hour after mixing. Do not retemper mortar.

3.2.3.4 Surface defect repair: Repair in accordance with ACI 301, Sections 9.1, 9.2 and 9.3. Cure concrete repairs same as new concrete.

### 3.2.4 Concrete Finishes and Tolerances

3.2.4.1 Formed surfaces: Start finishing, following concrete repair, and complete within 96 hours after forms have been removed. Finish in accordance with sections of ACI 301 noted below.

- |   |                |
|---|----------------|
| a. Surfaces exposed to earth backfill             | Section 10.2.1 |
| b. Interior surfaces                              | Section 10.2.2 |
| c. Exterior surfaces exposed to weather           | Section 10.2.2 |
| d. Related unformed surfaces                      | Section 10.5   |
| e. Surfaces to receive special protective coating | Section 10.3.2 |

3.2.4.2 Unformed surfaces: Finish in accordance with sections of ACI 301 noted below:

- |   |                |
|---|----------------|
| a. Interior floors                        | Section 11.7.3 |
| b. Exterior slabs subject to foot traffic | Section 11.7.4 |

### 3.3 CURING AND PROTECTION

#### 3.3.1 Curing

3.3.1.1 Cure concrete in accordance with ACI 301, Section 12.2. Clear curing compounds shall be tinted or applied surfaces marked to delineate extent of spraying.

3.3.1.2 Do not use curing compound on concrete surfaces to receive flooring or special protective coating.

#### 3.3.2 Protection

3.3.2.1 Protect concrete during extreme weather conditions in accordance with ACI 301, Section 12.3.

3.3.2.2 Protect concrete from mechanical injury in accordance with ACI 301, Section 12.4.

3.4 FIELD QUALITY CONTROL

3.4.1 Concrete Testing: Sampling and testing of concrete will be the responsibility of KEH. Concrete will be tested to ACI 301, Sections 16.3.4, 16.3.5, 16.3.6, and 16.3.8.

END OF SECTION

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SECTION 07200

INSULATION

PART 1 - GENERAL

1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

1.1.1.1 American Society for Testing and Materials (ASTM)

C 665-86

Standard Specification for  
Mineral-Fiber Blanket Thermal  
Insulation for Light Frame  
Construction and Manufactured  
Housing

1.1.1.2 Underwriters Laboratories, Inc (UL)

January 1988, Including  
July 1988 Supplement

Building Materials Directory

1.2 SUBMITTALS: Refer to Section 01300 for submittal procedures.

1.3 DELIVERY, STORAGE, AND HANDLING

1.3.1 Deliver materials to jobsite in original sealed containers or packages bearing manufacturer's name and brand designation. Where materials are covered by referenced specification, containers or packages shall bear specification number, type, and class as applicable.

1.3.2 Store and handle materials in manner to protect from damage during entire construction period.

1.3.3 Store insulation off ground and under cover to protect against weather, moisture, and physical damage.

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 Blanket Insulation: Mineral-fiber insulation meeting the requirements of ASTM C 665. Insulation containing asbestos will not be acceptable. Insulation shall be UL listed and have "flame spread" of 25 or less, and "smoke developed" of 50 or less.

2.1.1.1 Wall insulation: Type III mineral-fiber blanket with minimum thermal resistance of R-11 and faced with aluminum foil vapor barrier covering on 1 side. Insulation shall be capable of fitting into available space without compressing more than 10 percent in thickness.

2.1.1.2 Ceiling insulation: Type III mineral-fiber blanket with minimum thermal resistance of R-11 and faced with aluminum foil vapor barrier covering on 1 side.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

##### 3.1.1 Blanket and Batt Insulation

3.1.1.1 Fire riser room: Completely insulate space between framing members. Fit snugly into framing spaces leaving no voids. At walls and in ceiling spaces install with vapor barrier toward interior side of construction. Fasten flanges to metal studs with mechanical fasteners or adhesive as recommended by insulation manufacturer. Support insulation installed horizontally with No. 9 wire spaced at 2 feet maximum.

3.1.1.2 Install continuous behind electrical outlets. Fit around electrical conduits, pipes, and other protruding objects. When water pipes occur in exterior wall or ceiling construction, apply insulation between pipe and cold side of wall or ceiling.

3.1.1.3 Cut to fit angles, corners, or irregular spaces, forming flange of vapor barrier for fastening to framing. Seal joints or breaks in vapor barrier.

#### 3.2 FIELD QUALITY CONTROL: None Required

END OF SECTION

## SECTION 07920

### SEALANTS AND CAULKING

#### PART 1 - GENERAL

##### 1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

##### 1.1.1.1 American Society for Testing and Materials (ASTM)

C 834-76 (1986)

Standard Specification for One Component Laytex Sealing Compounds for Use in Building Construction

D 994-71 (1982)

Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type)

##### 1.1.1.2 Federal Specifications (FS)

TT-S-00230C,  
Including AMD 2

Sealing Compound: Elastomeric Type, Single Component (For Caulking, Sealing, And Glazing In Buildings And Other Structures)

TT-S-00227E,  
Including AMD 3

Sealing Compound: Elastomeric Type, Multicomponent (For Caulking, Sealing, And Glazing In Buildings And Other Structures)

##### 1.2 SUBMITTALS: Refer to Section 01300 for submittal procedures.

~~1.2.1 Manufacturer's Installation Instructions:--Include manufacturer's instructions for cleaning, priming, and application of sealants and caulking for each material condition of application along with products supplied.~~

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##### 1.3 DELIVERY, STORAGE, AND HANDLING

1.3.1 Deliver materials to jobsite in manufacturer's original containers, unopened and labels intact.

1.3.2 Store and handle materials to prevent inclusion of foreign materials or exposure to temperatures exceeding 90 F.

1.3.3 Discard sealants, caulking compounds, or components outdated as indicated by shelf life date.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

2.1.1 General: Container labels shall show name of material, date of manufacture, mixing instructions, shelf life, and curing time. Color to closely match adjacent surfaces.

#### 2.1.2 Sealants

2.1.2.1 Exterior building sealant: One component polyurethane: Nonsag type meeting the requirements of FS TT-S-00230, Type II, Dymonic, Manufacturer: Tremco.

2.1.2.2 Interior building caulking: One component acrylic laytex caulk with silicone: Nonsag type meeting requirements of ASTM C 834-76, Paintable, Manufacturer: DAP.

2.1.2.3 Interior vertical concrete joints: Single or multicomponent polyurethane: Nonsag type, gun grade meeting requirements of FS TT-S-00230 or FS TT-S-00227, Type II, Class A such as; Uniflex 200 manufactured by United Coatings.

2.1.3 Primer: Nonstaining type, as recommended by manufacturer of sealant or caulking compound for intended service.

2.1.4 Expansion Joint Filler: Watson Bowman & Acme Corporation "W" Series, or bituminous type meeting the requirements of ASTM D 994.

2.1.5 Backer Rod: Closed-cell polyethylene foam rod.

2.1.6 Bond Breaker Tape: Polyethylene tape with pressure sensitive adhesive.

## PART 3 - EXECUTION

### 3.1 PREPARATION

3.1.1 Clean joints, to be sealed or caulked, of dirt, dust, oil, grease, mortar, or other foreign materials.

3.1.2 Follow written instructions of manufacturer of sealing or caulking materials for each condition of application. Unless the written instructions of the manufacturer state otherwise, make depth of sealant joints 1/2 of the joint width.

3.1.3 After special protective coating has cured, roughen surfaces of concrete joints on which polyurethane sealant is applied.

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3.1.4 Remove loose particles with a wire brush. Blow out joints with oil-free and moisture-free compressed air. Remove wax or oil with methyl ethyl ketone or Xylol.

### 3.2 INSTALLATION

#### 3.2.1 Primer

3.2.1.1 Prime joints when and as recommended by sealant or caulking manufacturer for each condition of application.

3.2.1.2 Do not apply primer to concrete until concrete has cured at least 28 days.

#### 3.2.2 Backup

3.2.2.1 Install backer rod in joints where polyurethane sealant is to be applied. Install with proper tool in accordance with manufacturer's written instructions.

3.2.2.2 Install bond breaker tape over backer rod in joints where polyurethane sealant is to be applied.

3.2.3 Joint Dimension: Except as recommended otherwise by manufacturer, or shown on the Drawings, make depth of sealant 1/2 of joint width.

#### 3.2.4 Sealant and Caulking

3.2.4.1 Installation of caulk/sealant: Perform all caulk/sealant work using experienced workers, specified materials, and proper tools in accordance with manufacturer's written instructions for the conditions of each application. Tool after installation as required to properly fill the joint and produce a smooth surface. Take all necessary precautions to prevent excess contact of sealants with adjacent surfaces.

### 3.3 FIELD QUALITY CONTROL: None Required

END OF SECTION

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SECTION 08100  
METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

1.1.1.1 Steel Door Institute (SDI)

SDI-100-83

Standard Steel Doors and Frames

1.2 SUBMITTALS: Refer to Section 01300 for submittal procedures.

1.2.1 Fabrication Drawing: Submit Fabrication Drawing indicating the size and elevation of door and frame. Include location and details of hardware reinforcement and frame anchors.

1.3 DELIVERY AND STORAGE: Deliver to the jobsite in undamaged condition and store above ground and under cover. Storage of door and frame shall be in accordance with SDI-100.

1.3.1 Clean abraded or rusty areas on door or frame. Touch up with same primer used for shop finish.

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 Hollow metal door and frame shall be fabricated in accordance with SDI-100 and this Specification.

2.1.2 Metal Door

2.1.2.1 Door No. 5: Grade III, Model 4, 1-3/4 inch thick, seamless, composite construction.

2.1.2.2 See Drawing for type and size. No fire rating label shall be required.

2.1.2.3 Door shall be reinforced with polystyrene foam board bonded to face sheets with adhesive per SDI-100, subparagraph 2.2.3.3.

2.1.3 Pressed Metal Frame

2.1.3.1 See Drawings for profiles and dimensions.

- 2.1.3.2 Frame shall be welded construction, 16 gauge.
- 2.1.3.3 Three 18 gauge wall anchors and one floor anchor for each jamb.
- 2.1.3.4 Temporary spreader attached to bottom of each frame.
- 2.1.3.5 Plaster guards installed at hardware cutouts.
- 2.1.4 Shop Finish: Door and frames bonderized and painted with 1 coat of manufacturer's standard, rust-inhibitive primer. Primer containing lead will not be acceptable.

PART 3 - EXECUTION

3.1 INSTALLATION

- 3.1.1 Frames shall be installed in accordance with SDI-100 and this Specification.
- 3.1.2 Adjust frame height so door undercut is reduced to 3/8 inch.
- 3.1.3 Align jamb anchors with hinge and the strike locations at door frames.
- 3.1.4 Install door in conjunction with application of hardware and with uniform clearance at head and jambs. Leave in smooth operating condition.
- 3.2 FIELD QUALITY CONTROL: None Required .

END OF SECTION

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SECTION 08710

FINISH HARDWARE

PART 1 - GENERAL

1.1 REFERENCES: Not Applicable

1.2 SUBMITTALS: Refer to Section 01300 for submittal procedures.

1.2.1 Hardware List: Submit complete hardware list. List the hardware for each door separately under the door number and hardware requirement.

PART 2 - PRODUCTS

2.1 SPECIFIC REQUIREMENTS: See the Hardware Schedule at the end of this Section for specific requirements.

PART 3 - EXECUTION

3.1 PACKING AND MARKING: Pack each item of hardware separately with all necessary fasteners and instructions. Mark each item with the hardware number shown on the Hardware Schedule.

3.2 FASTENERS: Furnish and install all necessary screws, bolts, or other fasteners of suitable size and type to anchor the hardware in its intended position. Match hardware finish. Supply with expansion shields, toggle bolts, or other appropriate anchors.

3.3 PROTECTION: Protect hardware from damage at all times during construction, both prior to and after installation.

3.4 INSTALLATION AND FIT: Install each hardware item in accordance with manufacturer's written instructions. Provide drop plates at closers where required.

3.5 COMPLETION: Remove protective coverings and clean all hardware before completion of this project. Leave all hardware in smooth operating condition. Deliver all keys to KEH.

3.6 FIELD QUALITY CONTROL: Verify the installation and be responsible for the fit of hardware in the location specified.

3.7 HARDWARE SCHEDULE

GROUP NO.	ITEM	QUANTITY	TYPE	FINISH/MFR
1*	Hinges	1-1/2 PR	4-1/2 x 4-1/2 Butts FBB179	US26D/STANLEY
	Lockset	1	463 x 5610	US26D/CORBIN
	Closer	1	110H	SBL/CORBIN
	Threshold	1 EA	270A x 184A	AL/PEMCO
	Seals	1 SET	S88D	BRONZE/PEMCO
2**	Closer	1	110#	SBL/CORBIN
	<del>Auto door</del>	<del>1</del>	<del>412GR</del>	<del>PEMCO</del>
	<del>bottom</del>			

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\*Door No. 5  
\*\*Door Nos. 1 and 3

END OF SECTION

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## SECTION 09250

### GYPSUM BOARD

#### PART 1 - GENERAL

##### 1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

##### 1.1.1.1 American Society for Testing and Materials (ASTM)

C 36-85a	Standard Specification for Gypsum Wallboard
C 475-81	Standard Specification for Joint Treatment Materials for Gypsum Wallboard Construction
C 645-83	Standard Specification for Non-Load (Axial) Bearing Steel Studs, Runners (Track), and Rigid Furring Channels for Screw Application of Gypsum Board
C 954-86	Standard Specification for Steel Drill Screws for the Application of Gypsum Board to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness
C 1002-83	Standard Specification for Steel Drill Screws for the Application of Gypsum Board

##### 1.1.1.2 Federal Specifications (FS)

QQ-W-461H	Wire, Steel, Carbon (Round, Bare, And Coated)
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1.2 SUBMITTALS: Refer to Section 01300 for submittal procedures.

##### 1.3 DELIVERY, STORAGE, AND HANDLING

1.3.1 Store gypsum board at least 24 hours before installation in well ventilated, covered area heated to at least 55 F.

1.3.2 Maintain above environment throughout application of gypsum board and at least 24 hours after.

9 2 1 2 3 6 1 1 5 9

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 Gypsum Board

2.1.1.1 Standard board: ASTM C 36, tapered edge, Type X, thickness as noted. Supply in 48 inch width, lengths as required for minimum joints.

2.1.3 Metal Trim

2.1.3.1 Corner beads: United States Gypsum Co, No. 103.

2.1.3.2 Casing beads: United States Gypsum Co, No. 200A or 200B.

2.1.4 Reinforcing Tape (Joint Tape): ASTM C 475, 1-7/8 inch to 2-1/4 inch wide in accordance with manufacturer's standards.

2.1.5 Screws: Steel, self-tapping, phillips head, ASTM C 954 for steel studs 22 gauge and heavier, and ASTM C 1002, Type G (for gypsum), Type S (for light gauge steel), or Type W (for wood), length as recommended by the gypsum board manufacturer, 1 inch minimum.

2.1.6 Joint Compound: ASTM C 475.

2.1.7 Steel Studs and Runners: Screw studs, nonloadbearing channel type, roll-formed from 25 gauge painted or galvanized steel as noted on the Drawings, nominal 1 inch flange width, meeting the requirements of ASTM C 645.

PART 3 - EXECUTION

3.1 INSTALLATION

3.1.1 Steel Framing at Walls and Ceiling

3.1.1.1 Frame with steel studs 16 inches on center.

3.1.1.2 Align runners accurately. Fasten to floors with concrete anchors or other approved method at 24 inches on center maximum. Fasten ceiling joists to walls with sheet metal or gypsum board screws.

3.1.1.3 Plumb wall studs and attach to top and bottom runners with at least 1 gypsum board screw on each side of stud end. Install studs in continuous lengths.

3.2 APPLICATION

3.2.1 Gypsum Board, General

3.2.1.1 Inspect framing scheduled to receive gypsum board.



3.2.1.2 Apply gypsum board first to ceiling, then to walls. Use boards of maximum practical lengths in order to minimize joints. Bring boards into contact, but do not force into place. Fit boards neatly where ends or edges abut.

3.2.1.3 Install fasteners at least 3/8 inch from edges.

3.2.1.4 Apply metal trim to external angles in accordance with manufacturer's written instructions.

### 3.2.2 Ceiling Installation

3.2.2.1 Single ply: Apply gypsum board with long dimension at right angles to furring members.

### 3.2.3 Wall Installation

3.2.3.1 Single ply: Apply parallel or perpendicular to framing or furring members. Attach ends and edges over framing or furring members except where treated joints occur at right angles to members. Stagger joints on opposite sides of partition. When installing board perpendicular, attach upper board first.

### 3.2.4 Attachment to Steel Framing or Furring

3.2.4.1 Fasten gypsum board to framing and furring with screws. Drive screws with clutch-controlled power screwdrivers. Drive head slightly below surface.

3.2.4.2 Space screws 12 inches on center into each bearing for ceilings and 16 inches on center into each bearing for walls.

### 3.2.5 Taping and Finishing

3.2.5.1 Apply compound over joints in thin uniform layer, spread at least 3 inch wide, center reinforcing tape on joint and embed in compound. When dry, apply second coat of taping compound in thin uniform coat, minimum of 6 inch wide. Sand to eliminate ridges and high points.

3.2.5.2 Apply third coat of taping compound after second coat is dry and has been sanded. Feather out to minimum width of 12 inches. After compound has dried, sand as necessary to obtain uniformly smooth surface.

3.2.5.3 Finish over fasteners to be similar to finish over joint tape.

#### 3.2.5.4 Corner treatment

a. Treat internal corners in manner specified for joints except fold reinforcing tape lengthwise through middle and fit neatly into corner.

b. Fit corner bead neatly over external corner and fasten with screws approximately 6 inches on center and drive into framing members. Treat with joint compound and reinforcing in manner specified for joints. Feather out joint compound from 8 to 10 inches on each side of corner.

3.2.5.5 After conventional finishing of all gypsum panel joints and fasteners, apply skim coat of joint compound over entire wall surface prior to paint application. Compound shall be as recommended by board manufacturer.

3.3 FIELD QUALITY CONTROL: None Required

END OF SECTION

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SECTION 09805

SPECIAL PROTECTIVE COATING

PART 1 - GENERAL

1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

1.1.1.1 American Society for Testing and Materials (ASTM)

D 4259 Practice for Abrading Concrete

D 4260 Practice for Acid Etching  
Concrete

1.2 SUBMITTALS: Refer to Section 01300 for submittal procedures.

1.2.1 List of Materials: Submit complete list of materials, colors and location to be used, to substantiate compliance with the Drawings and this Section. List shall enumerate percentage of volatile and nonvolatile materials and percentage of component parts of each type of material.

1.2.2 Certificate of Compatibility: Submit letter stating that coatings are compatible with all polyurethane sealants, both existing and as listed in Section 07920 of this Specification, over which they will be applied. See Paragraph 1.4.3 for existing sealant.

1.3 DELIVERY, STORAGE, AND HANDLING

1.3.1 Deliver materials to site in manufacturer's unopened containers with labels intact. Do not open containers or remove labels until after inspection and acceptance by KEH.

1.3.2 Store materials in accordance with manufacturer's recommendations and in well ventilated area not exposed to excessive heat, sparks, flame, or direct rays of sun.

1.4 PROJECT CONDITIONS

1.4.1 Environment for Coating: Coat interior surfaces only when ambient and surface temperatures are above -50-F. *within the range specified in the product manufacturer's published literature.*

ECN-25

1.4.2 Warning! If heating of uninsulated building is required, pay particular attention to flashpoint of coating materials in relation to type of heating source to be used.

1.4.3 Existing joint sealant: Existing control, construction, and expansion joints in concrete slab, over which the special coatings shall be applied, have been sealed using Uniflex 200 polyurethane sealant manufactured by United Coatings, Greenacres, Washington.

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 Coating materials are products of Protective Coatings Division of Ameron, Brea, California or Maintenance & Marine Coatings Department of the Valspar Corporation, Azusa, California unless otherwise specified. Coating materials containing asbestos will not be accepted.

2.1.2 Surface Conditioner: Two component epoxy resin, graded silica filler; 82 pounds/cubic foot density, 3000 psi bond strength, 3000 psi tensile strength, shrinkage 15 percent or less, 10,800 psi compressive strength, 0.5 percent absorption, color: off-white. Products: NU-KLAD 114 as manufactured by Ameron.

2.1.3 Primer: Self-priming high solids epoxy or urethane coating, low sheen to semi-gloss finish, dark tan color, 50 percent solids (minimum), through dry time 18 hours or less at 50 F. Products: Amerlock 400 wc as manufactured by Ameron or Hi-Build Epoxy, 78 Series, as manufactured by Valspar or approved.

2.1.4 Finish Coat: Self-priming high build aliphatic polyurethane enamel, high or semigloss finish, light tan color, 50 percent solids (minimum), through dry time 24 hours (accelerated) or less at 50 F. Products: Amershield as manufactured by Ameron or Hi-Build Epoxy, 78 Series, as manufactured by Valspar.

PART 3 - EXECUTION

3.1 INSPECTION

3.1.1 Examine surfaces scheduled to receive paint and finishes for conditions that will adversely affect execution, permanence, or quality of work and which cannot be put into acceptable condition through preparatory work included in Article 3.2.

3.1.2 Report in writing to KEH conditions that may potentially affect proper application of finish. Do not commence surface preparation or coating application until defects have been corrected and conditions are made suitable.

3.2 PREPARATION

3.2.1 General

3.2.1.1 Before application, sweep and dust space or area to receive coating.

3.2.2 Pre-Priming: Clean concrete surfaces of laitance, oil, stains, dust, and other foreign material.

3.2.2.1 Where laitance has not been removed, clean concrete with uniform application of 1 of following.

a. Abrasive blast per ASTM D 4259.

b. Acid etch per ASTM D 4260.

3.2.2.2 If acid etch is used, rinse thoroughly with clean water when solution ceases to foam and scrub with stiff bristle brush. Allow treated area to thoroughly dry. Scratches, cracks, holes, and abrasions shall be cut back to proper key and filled with Nu-Klad 114.

3.2.2.3 Allow concrete to cure 30 days before coating is applied, except coating may be applied after concrete has cured 21 days if moisture content of concrete is less than 12 percent.

3.2.3 Post Priming

3.2.3.1 Feather abrasions, chips, skips, and holidays occurring in prime coat by sanding and recoat with material and color to minimum dry film thickness specified.

3.2.3.2 Previously coated surfaces shall be recoated only after existing film is completely dry.

3.2.3.3 Protect coatings from water until dry to touch.

3.2.4 Protection

3.2.4.1 Provide and install drop cloths, shields, and other protective devices required to protect surfaces adjacent to areas being coated. Keep spatter, smears, droppings, and overrun of coating materials to minimum and remove as coating work progresses.

3.2.4.2 Remove and store electrical fixtures, outlets and switch plates, mechanical diffusers, escutcheons, surface hardware, fittings, and fastenings before starting work. Clean and reinstall upon completion of work in each area. Use no solvent or abrasives to clean hardware that will remove lacquer finish normally used on some items.

3.3 APPLICATION

3.3.1 Fill all vertical expansion joints, at various locations along perimeter curb, with polyurethane sealant as called out under Section 07920 of this Specification.

3.3.2 Apply coating materials in accordance with manufacturer's recommendations.

3.3.3 Apply coatings with equipment recommended by manufacturer.

3.3.4 Identify each coat of opaque material by its relation to color of finish coat. Prime coat shall be darkest tint of specified color with each succeeding coat lighter, up to finish coat, which shall be color, tint, and sheen specified. Tints of identical coats of identical color and material shall not vary.

### 3.4 FIELD QUALITY CONTROL

3.4.1 Inspection: KEH will perform tests to ascertain that coating materials have been applied in accordance with this Section.

### 3.5 CLEANING

3.5.1 Furnish and maintain at site closed metal containers for disposal of waste materials. Place materials spotted or soaked with paint, oil, or solvents in containers.

3.5.2 Brushes, rollers, spatulas, and spray equipment shall be thoroughly cleaned after each use and shall contain no oils, thinners, or other residue after such cleaning.

3.5.3 Remove empty cans from site at end of each shift.

3.5.4 At completion of coating work, remove materials, containers, rags, cloths, brushes, and other equipment from site. Clean up spills.

### 3.6 COATING SCHEDULE

	Minimum Wet Film Thickness	Minimum Dry Film Thickness
3.6.1 Concrete		
Prime Coats:		
Hi-Build (78 Series)	7 mils	5 mils
Amerlock 400 wc	6.5 mils	5 mils
Finish Coats:		
Hi-Build (78 Series)	7 mils	5 mils
Amershield	7 mils	5 mils

3.7 FIELD QUALITY CONTROL: None Required

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## SECTION 09900

### PAINTING

#### PART 1 - GENERAL

##### 1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

##### 1.1.1.1 American Society for Testing and Materials (ASTM)

C-309-81	Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete	ECN-32
D 16-84	Standard Definitions of Terms Relating to Paint, Varnish, Lacquer, and Related Products	

##### 1.1.1.2 Federal Specifications (FS)

SS-S-1996	Sealer, -Water-And-Weather Resistant, -For-Asphalt, -Concrete, And-Masonry-Surfaces	ECN-32
TT-E-509B, Including AMD 2	Enamel, Odorless, Alkyd, Interior, Semigloss, White And Tints	
TT-E-545B, Including AMD 1	Enamel, Odorless, Alkyd, Interior-Undercoat, Flat, Tints And White	
TT-P-102E, Including INT AMD 1	Paint, Oil (Alkyd Modified, Exterior, White And Tints)	
TT-P-641G, Including AMD 1	Primer Coating; Zinc Dust-Zinc Oxide (For Galvanized Surfaces)	
TT-P-645A	Primer, Paint, Zinc Chromate, Alkyd Type	
TT-P-650C, Including AMD 1	Primer Coating, Latex Base, Interior, White (For Gypsum Wallboard)	

TT-P-1511B

Paint, Latex (Gloss And Semi-  
gloss, Tints And White)(For  
Interior Use)

TT-S-179B,  
Including AMD 1

Sealer, Surface: Pigmented Oil,  
For Plaster And Wallboard

1.1.1.3 Federal Standards (FED STD)

FED-STD-595A, Including Color  
CHGS NOT 1, 2, 3, 4,  
5, 6, 7, 8, 9

1.1.1.4 Military Specification (MS)

DOD-P-15328D, Primer (Wash), Pretreatment  
Including AMD 1 (Formula No. 117 For Metals)

1.1.1.5 Steel Structures Painting Council (SSPC)

Surface Preparation Specifications

SSPC-SP 2-82 No. 2 Hand Tool Cleaning

SSPC-SP 3-82 No. 3 Power Tool Cleaning

1.2 SUBMITTALS: Refer to Section 01300 for submittal procedures.

1.3 DELIVERY, STORAGE, AND HANDLING

1.3.1 Deliver materials to jobsite in sealed, original, labeled containers each bearing manufacturer's name, type of paint, brand name, color designation, and instructions for mixing and/or reducing.

1.3.2 Store materials at minimum ambient temperature of 45 F in well ventilated and heated area or areas.

1.3.3 Take precautions to prevent fire hazards and spontaneous combustion.

1.4 PROJECT CONDITIONS

1.4.1 Environmental Requirements

1.4.1.1 Temperature

a. Unless otherwise recommended by paint manufacturer, apply coatings when ambient and surface temperatures are between 45 F and 95 F except water-thinned paints and other special coatings. Apply water-thinned paints when ambient and surface temperature is between 50 F and 90 F.

b. Should temporary heat be required, provide until specified surface and air temperatures exist for required time period. Maintain temporary heat for 24 hours after paint and finish application.

1.4.1.2 Weather

a. Do no exterior work on unprotected surfaces if it is raining or moisture from other source is present or expected before applied paints can dry or attain proper cure without damage.

b. Allow wet surfaces to dry and attain required temperatures and conditions specified before proceeding with work or continuation of previously started work.

c. Do not apply finish in areas where dust is being generated.

1.4.1.3 Ventilation: Provide adequate continuous ventilation required for drying various materials as recommended by paint manufacturer.

1.4.1.4 Illumination: Do not proceed with work unless minimum lighting level of 15 foot-candles is provided on surfaces to be painted or finished. Provide temporary lighting to attain lighting level specified.

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 Terms used are defined in ASTM D 16.

2.1.2 Sealers

2.1.2.1 Concrete floor, interior: Refer to Section 09805.

2.1.2.2 Exterior concrete ramps, clear: FS-SS-S-1996: *ASTM C 309*.

ECN-32

2.1.2.3 Interior concrete curbs (tops only) and fire riser room floor, clear: FS-SS-S-1996: *ASTM C 309*.

ECN-32

2.1.3 Primers

2.1.3.1 Enamel undercoat: FS TT-E-545 (alkyd).

2.1.3.2 Zinc chromate: FS TT-P-645, (alkyd type). Tint with lamp black to produce color other than yellow.

2.1.3.3 Zinc dust-zinc oxide: FS TT-P-641, Type II.

2.1.3.4 Wallboard: FS TT-P-650, Type 1, (latex base).

2.1.4 Paints

2.1.4.1 Oil, exterior: FS TT-P-102, PPG 1 line.

2.1.4.2 Semigloss enamel, interior: FS TT-E-509.

2.1.4.3 Latex, interior, semigloss: FS TT-P-1511, Type I, or PPG acrylic latex enamel, 6 Line.

2.1.4.4 Concrete floor, interior (except fire riser room): Refer to Section 09805.

2.1.5 Other Materials: Materials not specifically described but required to achieve specified finishes shall be of high quality and of manufacture approved by KEH.

2.1.6 Special Protective Coatings: See Section 09805.

2.1.7 Hazardous Material Restrictions

2.1.7.1 Lead: Do not use paint that contains more than 0.06 percent lead by weight in total nonvolatile content of paint.

2.1.7.2 Mercury: Do not use mercurial fungicides in exterior oil paints.

2.1.8 Colors and Tints: Paint manufacturer's standard colors and tints.

### PART 3 - EXECUTION

#### 3.1 INSPECTION

3.1.1 Examine surfaces scheduled to receive paint and finishes for conditions that will adversely affect execution, permanence, or quality of work and which cannot be put into acceptable condition through preparatory work included in Article 3.2.

3.1.2 Report in writing to KEH conditions that may potentially affect proper application of finish. Do not commence surface preparation or coating application until defects have been corrected and conditions are made suitable.

#### 3.2 PREPARATION

##### 3.2.1 New Surface

3.2.1.1 Surfaces to be coated shall be in proper condition to accept and assure proper adhesion of coating system.

##### 3.2.1.2 Ferrous metals

a. For shop primed surfaces, apply phosphoric acid etch solution at field welded or abraded spots and let set for time recommended by acid etch manufacturer, rinse with potable water, and when dry, apply prime coat. Wash primed surfaces free of dirt, oil, and grease.

b. Prepare ferrous metals in accordance with SSPC-SP 2 Hand Tool Cleaning and/or SSPC-SP 3 Power Tool Cleaning. Mill scale may be present on cleaned surface providing it is fully anchored, gives metallic appearance and

does not cover more than 30 percent of surface. Prime ferrous metals within four hours after preparation.

3.2.1.3 Galvanized metals: Remove surface contamination, wash metal with phosphoric acid or approved solution, or apply one coat of etching type primer.

3.2.1.4 Nonferrous metals: Remove surface contamination by steam, high pressure water, or solvent washing. Apply etching type primer, (or) acid etch, let dry, then prime paint.

3.2.1.5 Gypsum wallboard: Remove contamination, dust, and dirt. If surface defects appear after prime coating, have defects repaired. After defects are corrected, apply primer over repaired areas.

### 3.2.2 Mixing and Thinning

3.2.2.1 General: Packaged paint may be thinned before application where necessary to suit conditions of surface, temperature, weather, and method of application. Follow manufacturer's written instructions for thinning packaged paint. Use of thinner shall not relieve Contractor from obtaining complete hiding. Do not mix paints of different manufacturers.

3.2.2.2 Pretreatment wash: Mix by adding one volume of acid component to four volumes of resin component. Add acid component slowly to resin component with constant stirring. Use within eight hours. Material may be reduced with normal butyl alcohol or 99 percent isopropyl alcohol if thinning is required to maintain wet spray.

### 3.2.3 Protection

3.2.3.1 Cover or otherwise protect finished work of other trades, surfaces not to be painted, or surfaces not concurrently being painted.

3.2.3.2 Provide sufficient drop cloths, shields, and protective equipment to prevent spray or drippings from fouling surfaces not being painted, including surfaces in paint storage and preparation areas.

3.2.3.3 Place cotton waste, cloths, and materials which may constitute fire hazard in closed metal containers and remove daily from jobsite.

3.2.3.4 Where toxic materials, and both toxic and explosive solvents are used, take appropriate precautions in accordance with manufacturer's written instructions and applicable safety regulatory agencies. In applying acid etch coating or solutions to metals, concrete, plaster, and toxic materials to copper, provide ventilation and take protective measures to meet requirements of safety regulatory agencies.

## 3.3 APPLICATION

3.3.1 Surfaces to be Painted and Finished: Paint surfaces scheduled or shown. Finish factory-primed materials in accordance with this Section.

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3.3.2 General: Paint may be applied by brush, roller, or spray unless otherwise specified. At time of application, paint shall show no signs of deterioration. Maintain uniform suspension of pigments during application.

3.3.2.1 Apply paint so finished surfaces are free of runs, drops, ridges, waves, laps, brush marks, and variations in color, texture, and finish. Hiding shall be complete. Apply each coat as film of uniform thickness. Use rollers of type designed for coating to be applied and surface to be coated. Ensure that surfaces including edges, corners, crevices, welds, and rivets receive film thickness equivalent to adjacent painted surfaces.

3.3.2.2 Touch up suction spots or make overall application of primer or sealer on first coat on gypsum wallboard and other surfaces to produce uniform color and gloss.

3.3.2.3 Touch up exterior concrete sealer coats to eliminate dull spots. Wipe off excess sealer after each application.

3.3.3 Coating Progress: Allow time between successive coats to permit proper drying. Modify drying times to suit abnormal environmental conditions. Oil base or oleoresinous solvent type paints are ready for recoating when paint feels firm, does not deform or feel sticky under moderate pressure of thumb, and application of another coat of paint does not cause lifting or loss of adhesion of undercoat.

3.3.4 Sprinkler System: Sprinkler system outside the building shall be painted in accordance with Section 02668.

3.3.5 Time Between Surface Preparation and Painting: Apply first coat on surfaces that have been cleaned, pretreated, and otherwise prepared for painting as soon as practicable after such pretreatment has been completed, but before deterioration of prepared surface.

3.3.6 Pretreatment Wash Coat: Apply vinyl type wash coat by brush or spray. Maintain wet spray at all times.

#### 3.4 CLEANING

3.4.1 At completion of each day, remove painting materials, empty containers, rags, cloths, brushes, or other equipment. Store or dispose of as appropriate.

3.4.2 As work proceeds and upon completion, promptly remove paint where spilled, splashed, or spattered.

3.4.3 At conclusion of work, leave premises neat and clean to satisfaction of KEH.

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### 3.5 PAINTING AND FINISH SCHEDULE

		<u>Minimum Dry Film</u>	<u>Sq Feet Per Gallon</u>
3.5.1	Exterior		
3.5.1.1	Ferrous Metal, Oil		
	Pretreatment: MS DOD-P-15328	0.5 mil	
	Prime Coat: FS TT-P-645	1.5 mil	
	2nd Coat: FS TT-P-102		400
	Finish: FS TT-P-102		400
3.5.1.2	Galvanized Metal, Oil		
	Pretreatment: MS DOD-P-15328	0.5 mil	
	Prime Coat: FS TT-P-641, Type II	1.5 mil	
	2nd Coat: FS TT-P-102		400
	Finish: FS TT-P-102		400
3.5.1.3	Overhead Coiling and Metal Doors See Paragraph 3.5.2.2 (Interior)		
3.5.2	Interior		
3.5.2.1	Ferrous Metal, Enamel, Semigloss		
	Pretreatment: MS DOD-P-15328	0.5 mil	
	Prime Coat: FS TT-P-645	1.5 mil	
	2nd Coat: FS TT-E-509	1.5 mil	
	Finish: FS TT-E-509	1.5 mil	
	NOTE: Preprimed steel bents shall be touched up only - no finish coats shall be required.		
3.5.2.2	Metal Doors and Frames and Overhead Coiling Doors, Enamel, Semigloss		
	Prime Coat: By Door Manufacturer	1.5 mil	
	2nd Coat: FS TT-E-509	1.5 mil	
	Finish: FS TT-E-509 (Interior and Exterior)	1.5 mil	
3.5.2.3	Gypsum Board, Latex, Semigloss		
	Sealer: FS TT-S-179 or PPG 6-2		400
	Prime Coat: FS TT-P-650		400
	2nd Coat: FS TT-P-1511, Type I, or PPG 6 Line		400
	Finish: FS TT-P-1511, Type I, or PPG 6 Line		500
3.5.3	Use products of same manufacturer within coating system.		

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3.6 COLOR SCHEDULE

Colors shall be as follows:

3.6.1 Barricade Posts: Safety yellow, PPG No. 23-780 or red No. 21105 as called out in Federal Standard No. 595. See drawings for locations.

3.6.2 Miscellaneous Steel Framing: Match prime coat to existing primed components of metal building.

3.6.3 Hollow Metal Doors and Frames: Products of PPG.

3.6.3.1 Doors: White to match color of coiling door (see Paragraph 3.6.4).

3.6.3.2 Frames: Blue to match building color (provided by others).

3.6.4 Overhead Coiling Doors: Product of PPG. White, submit color to KEH for approval.

3.6.5 Interior perimeter steel base plate: Prime to match existing primed components of metal building.

3.6.6 Gypsum Board: Antique Ivory, PPG No. 2490.

3.6.7 Sprinkler System: Red, No. 21105, as called out in Federal Standard No. 595.

3.6.8 Gutters and Downspouts: *Paint gutters to match trim on metal building and downspouts to match metal siding.*

ECN-12

3.6.93-6-8 Interior Concrete Ramps at Overhead Doors, Man Doors, and Step to Enclosure: Safety yellow as called out in Federal Standard No. 595. Paint used must be compatible with Special Protective Coating of Section 09805.

ECN-12

3.6.103-6-9 Where paint is scheduled, but color is not specifically called out in the above Schedule, the surface shall match to surrounding areas.

ECN-30

3.7 FIELD QUALITY CONTROL: None Required

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SECTION 15300  
FIRE PROTECTION

PART 1 - GENERAL

1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

1.1.1.1 American National Standards Institute (ANSI)

ANSI B31.1-1986 Edition

American National Standard Code  
for Pressure Piping-Power Piping

1.1.1.2 American Welding Society (AWS)

AWS D1.1-88

Structural Welding Code-Steel

1.1.1.3 Factory Mutual System (FM)

1988 Edition

Approval Guide

1.1.1.4 Federal Specification (FS)

TT-S-00230C,  
Including AMD 2

Sealing Compound: Elastomeric  
Type, Single Component (For  
Caulking, Sealing, and Glazing  
in Buildings and Other  
Structures)

1.1.1.5 National Fire Protection Association (NFPA)

NFPA 13

Standard for the Installation of  
Sprinkler Systems, 1987 Edition

1.1.1.6 Underwriters Laboratories, Inc (UL)

January 1988, Including  
July 1988 Supplement

Fire Protection Equipment  
Directory

1.2 SUBMITTALS: Refer to Section 01300 for submittal procedures.

1.2.1 Approval Data: Submit information listed in Column 5 of Vendor Data List in this Section.

1.2.2 Certified Vendor Information (CVI): Submit information listed in Column 6 of Vendor Data List in this Section.

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1.2.3 Design/Fabricator Drawings: Submit Design, Fabrication, and Installation Drawings of automatic dry-pipe sprinkler system. Design in accordance with NFPA 13 for ordinary hazard occupancy classification. Size system in accordance with Pipe Schedule in NFPA 13, Section 3-6. Include applicable requirements of NFPA 13, Article 1-9, and this Section. The design shall provide complete sprinkler protection throughout the building.

1.2.3.1 Identify preliminary layouts.

1.2.3.2 Identify proposed deviations from specified materials or design requirements in writing.

1.2.3.3 Design shall be prepared under the supervision of, and submittal stamped by, a licensed professional fire protection engineer.

1.2.4 As-Built Drawings: Submit As-Built Drawings of dry-pipe sprinkler system.

1.2.5 NFPA Test Certificate: Complete Contractor's Material and Test Certificate in accordance with NFPA 13, Section 1-12.

### 1.3 SYSTEM DESCRIPTION

1.3.1 Sprinkler system shall include a Fire Department connection, check valves, and a 4 inch dry-pipe system alarm valve supplied with standard trim including flow alarm pressure switch, system main drain valve, water motor alarm gong, automatic air maintenance compressor, and a low air pressure supervisory switch. The system shall include all other appurtenances required by this Specification and NFPA 13.

1.3.2 Components of sprinkler system, if not designated in this Section and the Drawings by manufacturer's name and model/figure number, shall be current products of manufacturer and UL listed or FM approved for use intended.

### 1.4 QUALITY ASSURANCE

1.4.1 Welding Documentation: Fabricator shall ensure that welders in his employ are qualified in accordance with AWS requirements before performing shop or field welding on structural steel components which are part of this Section. Welder qualification test results shall be made available to KEH upon request. Proposed AWS welding procedures shall be subject to review by KEH.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

#### 2.1.1 Piping

2.1.1.1 Pipe and fittings: Meet the requirements of NFPA 13. Piping shall be Schedule 40 steel with threaded or grooved type (rubber-gasketed) fittings. Rubber-gasketed fittings for use with plain end pipe shall not be used.

2.1.1.2 Flexible couplings: Bolted-sleeve type for use with grooved-end pipe, with rubber rings for sealing. Couplings and gaskets shall be approved for use on dry-pipe sprinkler systems.

2.1.2 Reducers: One-piece concentric threaded reducers or reducing tees for straight run reduction in pipe sizes. Grooved type, rubber-gasketed reducing couplings, and hexagonal or face bushings shall not be used without approval of KEH.

2.1.3 Sealant: Light-colored, polysulfide-base compound, meeting the requirements of FS TT-S-00230, Type II.

2.1.4 Identification Labels: Approximately 2-1/4 inch by 14 inch bearing words "FIRE PROTECTION WATER" and direction arrow approximately 2-1/4 inch by 7 inch. Labels shall have adhesive backing.

#### 2.2 EQUIPMENT

2.2.1 Water Motor Alarm Gong: Weatherproof mechanical gong with hood, complete with drain and interconnecting piping.

##### 2.2.2 Switches

2.2.2.1 The flow alarm pressure switches for installation on the sprinkler systems shall have pressure-actuated, normally-open contacts.

2.2.2.2 An adjustable low air pressure supervisory switch shall be installed on the dry-pipe sprinkler system to annunciate a failure to maintain a proper air supply in the system.

2.2.3 Automatic Sprinklers: Nominal 1/2 inch diameter orifices, rated for intermediate temperature classification, unless other temperature ratings are required by NFPA 13.

2.2.4 Sprinkler Cabinet: Provide with required number of sprinkler heads of ratings and types installed, a sprinkler wrench, and locate adjacent to riser.

2.2.5 Fire Department Connection: Cast brass and furnished with self-closing double clappers, plugs and chains, automatic ball-drip valve, and escutcheon plate. Connection shall be 4 inch IP x 2-1/2 inch HT x 2-1/2 inch HT. Hose threads shall be National Standard Fire Hose threads, 7-1/2 TPI.

2.2.6 Air Compressor: Provide an air compressor for the dry-pipe sprinkler system. A 110 volt, single-phase local power supply shall be provided to the valve enclosure as shown on the Drawing. Electrical installation and wiring shall be performed in accordance with the applicable requirements of Section 16400.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

3.1.1 Install automatic dry-pipe sprinkler system in accordance with NFPA 13 for ordinary hazard occupancy classification.

3.1.2 Coordinate requirements for interruption of existing services and Fire Department standby with KEH.

3.1.3 Protect new piping from damage by earthquake, by proper clearance around penetration holes, flexible couplings, and sway bracing in accordance with NFPA 13, Sections 3-10.3 and A-3-10.3.

3.1.4 Pack all sprinkler pipe penetrations through walls with fiberglass or mineral-wool packing and seal on both sides with polysulfide sealant. Install escutcheons on sides exposed to view.

3.1.5 Repair damaged surfaces. Refinish repaired or defaced surfaces to match adjacent undisturbed areas.

3.1.6 Terminate exterior discharge, inspectors test, and auxiliary drain lines with 45 degree elbows, turned down.

3.1.7 Provide suitable splash-pads, at exterior discharge locations, on other than paved surfaces.

#### 3.1.8 Welding

3.1.8.1 Limit welding to fabrication of supports or braces, if necessary. No other onsite welding will be permitted.

3.1.8.2 Perform welding of steel structural elements in accordance with AWS D1.1.

3.1.8.3 Do not perform welding or flame cutting on or within building without written approval of KEH.

3.1.8.4 Perform visual weld examination in accordance with AWS D1.1, Paragraph 6.5.5 (8.15).

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### 3.1.9 Hangers, Supports, and Braces

3.1.9.1 Hang, support, and brace sprinkler system piping from building structural steel members, or to metal supports attached to building structure in accordance with NFPA 13.

3.1.9.2 Obtain written authority to weld, punch, drill, or cut structural steel members to provide attachment of hangers, supports, or braces.

3.1.9.3 When required, deliver to KEH a detailed mathematical analysis, by a registered professional engineer, of structural integrity where questionable alteration of building structural components are proposed. Analysis may also be required where obvious deformation of structural members are caused by hanging sprinkler piping.

3.1.10 Signs: Permanent type identification signs shall be installed at control, drain, test, and alarm valves. Legend shall include warning of Fire Department response to operation of valve.

### 3.1.11 Identification Labels

3.1.11.1 Install labels after painting is completed.

3.1.11.2 Locate labels on pipe where they can be easily read. Place labels on bottom quadrant of overhead pipe and top quadrant of pipe lower than eye level.

3.1.11.3 Identify only feed mains, cross mains, and risers 3 inch nominal diameter and larger.

3.1.11.4 Locate line identification at intervals of approximately 40 feet on unobstructed runs, and on each side of partitions and floors.

## 3.2 FIELD QUALITY CONTROL

### 3.2.1 Flushing and Testing

#### 3.2.1.1 General

a. Furnish equipment and instruments required to perform flushing and testing operations described below.

b. Conduct flushing and testing operations while witnessed by KEH.

c. Remove and replace pieces of apparatus, material, or work which fails in flushing or testing operations and retest.

d. Repair damage resulting from flushing or testing to satisfaction of KEH.

3.2.1.2 Flushing: Flush new sprinkler system piping as described below:

a. Flush sprinkler piping by feeding water into system through alarm valve to provide velocity of at least 7 feet per second in piping being flushed.

b. Discharge flushing water from end of cross mains.

c. Discharge flushing water to point designated by KEH. Flushing shall continue until effluent runs clear and free of foreign matter.

d. Provide documented evidence that flushing has been accomplished in accordance with this Section. Deliver to KEH before testing.

3.2.1.3 Hydrostatic test

a. Hydrostatically test new sprinkler system in accordance with NFPA 13, Section 1-11.2. Document test on NFPA test certificate for each system.

b. Use hydrostatic test pressure of 200 psi.

c. Leaks in piping will not be acceptable.

3.2.1.4 Dry-Pipe System Tests

a. Perform dry-pipe sprinkler system tests per NFPA 13, Section 1-11.3.

b. Document test results on NFPA test certificate for each system.



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Project No. W-033 through W-037		KAISER ENGINEERS HANFORD																		
Title RMW Storage Facilities		VENDOR DATA LIST																		
		("X" Indicates Required Data)																		
1 EPN Identification	2 Description	3 Reference Drawing	4 Specification Paragraph	5 Approval/Data								6 Certified Vendor Information (CVI)								7 Remarks
				Dimensional Drawings	Equipment Weights	Specifications	Material Description	Performance Data	Circuit or Control Diagrams	Data Sheets	Illustrative Cuts	Installation Instructions	Dimensional Drawings	Equipment Weights	Specifications	Certified Test Data	Circuit or Control Diagram	Instructions		
																Installation	Operation	Maintenance		
1	Dry Pipe Valve		1.3.1									X		X				X	X	
2	Water Motor Alarm Gong		2.2.1									X								
3	Fire Department Connection (FDC)		2.2.5									X								
4	Check Valves		1.3.1									X								
5	Flow Alarm Pressure Switch		2.2.1									X								
6	Low Air Pressure Supervisory Switch		2.2.2									X								
7	Sprinkler Heads		2.2.3									X								
8	Flexible Couplings and Gaskets		2.1.1.2								X									
9	Air Compressor		2.2.6					X			X		X					X	X	

\*Submit all approved items under Column 5 to  
Vendor Data File at completion of work.

W033C2.AB

END OF SECTION  
15300 - 7W-033-C2  
As-Built Rev

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## SECTION 15500

### HEATING, VENTILATING, AND AIR CONDITIONING

#### PART 1 - GENERAL

##### 1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

1.1.1.1 Air Movement and Control Association, Inc (AMCA)

AMCA Standard 210-74

Laboratory Methods of Testing  
Fans for Rating Purposes

1.1.1.2 American Society for Testing and Materials (ASTM)

A 307-86a

Standard Specification for  
Carbon Steel Bolts and Studs,  
60,000 psi Tensile Strength

A 563-84

Standard Specification for  
Carbon and Alloy Steel Nuts

1.1.1.3 Sheet Metal and Air Conditioning Contractors National Association,  
Inc (SMACNA)

1983, 1st Edition

HVAC Systems--Testing, Adjusting  
and Balancing

1.1.1.4 Underwriters Laboratories, Inc (UL)

January 1988, Including  
July 1988 Supplement

Building Materials Directory

1.2 SUBMITTALS: Refer to Section 01300 for submittal procedures.

1.2.1 Certified Vendor Information (CVI): Submit information listed in Column 6 of Vendor Data List in this Section.

1.2.2 Test and Balance Data: Submit documentation of test and balance data, dated and signed by contractor executing test.

#### PART 2 - PRODUCTS

##### 2.1 MATERIALS

2.1.1 Fasteners: ASTM A 307, Grade A or B bolts, with heavy hex nuts meeting the requirements of ASTM A 563, UNC threads, bolt head marking not required. Finish to be cadmium plating or electro-galvanizing.

## 2.2 EQUIPMENT

### 2.2.1 Wall Exhausters

2.2.1.1 Unit shall be ~~Greenheck-Fan-Corporation, Model-GWB-21,-~~  
~~Loren Cook Co., Model W195W4B,~~ 1/3 horsepower, 3000 cfm at 0.25 inches  
water gauge static pressure. Unit shall be equipped with bird screen, wall  
grille, and gravity damper. Unit shall be belt-driven type with drives  
sized for 165 percent of driven horsepower. The motor pulley shall be  
adjustable for final system balancing. A disconnect switch shall be factory  
installed and wired from the fan motor to the disconnect junction box.  
Motor shall be equipped with over-current protection. Unit shall bear the  
AMCA certified performance seal for air performance. Unit wiring shall be  
120 volt, single-phase.

ECN-13

ECN-13

### 2.2.2 Louver

2.2.2.1 ~~American-Warming-and-Ventilating,-Inc, Vent Products Co. Inc.,~~  
~~Model EE-33 2825.~~ Louvers shall be flanged for flush surface application.  
Jambs shall be constructed with integral downspouts for carrying water from  
the blades to the louver sill. Screens shall be provided on the interior  
surface of the louvers and shall be 1/2 inch mesh. Louvers shall be  
constructed of extruded aluminum with an anodized finish with 1 coat of  
lacquer. Louvers shall be 36 inch by 36 inch, passing 3000 cfm with less than  
.15 water gauge pressure drop. Louvers shall be equipped with 2 inch, 30  
percent filters.

ECN-13

ECN-13

2.2.3 Baseboard Heater: Chromalox, Model BBF-31, baseboard heater.  
Voltage shall be 120 volts, single-phase, 60 cycles. Heater output shall be  
750 watts. Baseboard length shall be 36 inches. Provide wall-mounted  
thermostat, line voltage, range 40 to 80 F, Model WR-80. Unit shall be UL  
listed.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

#### 3.1.1 Equipment

3.1.1.1 Install where shown on the Drawings in accordance with  
manufacturer's written instructions.

### 3.2 FIELD QUALITY CONTROL

#### 3.2.1 Testing and Balancing HVAC Systems

3.2.1.1 After system is installed, place exhaust fans in operation in  
accordance with manufacturer's written instructions. After fans have been in

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operation for at least four hours, balance the HVAC system in accordance with SMACNA HVAC Systems--Testing, Adjusting and Balancing Publication, and under surveillance of KEH.

ECN-31  
ECN-31

3.2.1.2 Furnish instruments, materials, and labor required to perform testing and balancing of systems. Instruments shall have been calibrated by approved testing laboratory with date of calibration marked on them.

3.2.1.3 Do not use instruments which are part of system for testing and balancing. Check instruments of system against test instruments.

3.2.1.4 Data to be recorded

a. After test has been performed, submit Test and Balance Data Report in accordance with Paragraph 1.2.2. Test data shall be tabulated and submitted with flow sheet indicating points of measurement.

3.2.1.5 Testing and balancing sequence: Perform in accordance with sequence given by SMACNA.



SECTION 16400

SERVICE AND DISTRIBUTION  
(600-Volt and Below)

PART 1 - GENERAL

1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

1.1.1.1 American National Standards Institute (ANSI)

ANSI C80.1-1983 American National Standard for  
Rigid Steel Conduit--Zinc Coated

ANSI C82.1-1977 American National Standard  
Specifications for Fluorescent  
Lamp Ballasts

ANSI C97.1-1972 American National Standard for  
Low-Voltage Cartridge Fuses  
600 Volts or Less

1.1.1.2 Federal Specifications (FS)

W-C-375B/GEN, Circuit Breakers, Molded Case;  
Including Notice 1 Branch Circuit And Service

W-F-406D Fittings For Cable, Power,  
Electrical And Conduit, Metal,  
Flexible

W-P-115B Panel, Power Distribution

TT-S-00230C, Sealing Compound: Elastomeric  
Including AMD 2 Type, Single Component (For  
Caulking, Sealing, And Glazing  
In Buildings And Other  
Structures)

WW-C-566C Conduit, Metal, Flexible

1.1.1.3 National Electrical Manufacturers Association (NEMA)

Standards Publication/ Fittings and Supports for Conduit  
No. FB 1-1983 w/Rev through and Cable Assemblies  
Sep 1984

- Standards Publication/  
No. ICS 6-1983 w/Rev through  
Nov 1986
- Standards Publication/  
No. KS 1-1983 .
- Standards Publication/  
No. PB 1-1984
- Standards Publication/  
No. RN 1-1980
- Standards Publication/  
No. WD 1-1983
- Enclosures for Industrial  
Controls and Systems
- Enclosed Switches
- Panelboards
- Polyvinyl-Chloride Externally  
Coated Galvanized Rigid Steel  
Conduit and Electrical Metallic  
Tubing
- General Requirements for Wiring  
Devices
- 1.1.1.4 National Fire Protection Association (NFPA)  
NFPA 70 National Electrical Code,  
1987 Edition
- 1.1.1.5 Underwriters Laboratories, Inc (UL)  
May 1988 Electrical Appliance and  
Utilization Equipment Directory  
May 1988 Electrical Construction Materials  
Directory  
UL 797-1977 Standard for Electrical Metallic  
Tubing
- 1.2 SUBMITTALS: Refer to Section 01300 for submittal procedures.
- 1.2.1 Approval Data: Submit information listed in Column 5 of Vendor  
Data List in this Section.
- 1.3 QUALITY ASSURANCE
- 1.3.1 Standards: Products shall be identified for intended purpose by  
UL in the Electrical Appliance and Utilization Equipment Directory or  
Electrical Construction Materials Directory and bear listing mark of  
laboratory. In absence of mark, submit documentation of applicable listing.  
Listing and marking by UL is not required for products specified to meet the  
requirements of a national standard or designated by manufacturer's part  
number on the Drawings or in this Section.



PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 Solderless Connectors and Terminal Lugs: Pressure type, rated for use with copper or aluminum conductors with insulating caps or covers rated for system utilization voltage. Connectors shall be types specified below:

2.1.1.1 For conductors #8 AWG and smaller:

- a. Ideal Industries, Inc "Wire-Nuts."
- b. Thomas and Betts Company "Sta-Kon."
- c. 3M Company "Scotchlok."

2.1.1.2 For conductors #6 AWG and larger:

- a. Burndy Engineering Company "Screw Pressure Connectors" or "Hydent."
- b. Thomas and Betts Company "Lock-tite."

2.1.2 Raceways, Fittings, and Boxes

2.1.2.1 Conduit shall meet the requirements of appropriate standard as follows:

- a. Rigid steel ANSI C80.1
- b. Electrical metallic tubing (EMT) UL 797
- c. Flexible metal FS WW-C-566

2.1.2.2 PVC coating on rigid steel conduit: Factory applied and meeting the requirements of NEMA RN 1, Type A-40.

2.1.2.3 Conduit fittings for rigid steel and EMT shall meet the requirements of NEMA FB 1. Only compression type threadless fittings shall be used with EMT.

2.1.2.4 Fittings used with flexible metal conduit shall meet the requirements of FS W-F-406 and be squeeze type only. Flexible metal conduit shall have integral ground conductor.

2.1.2.5 Use "Myers" type watertight fittings or sealing locknuts manufactured by Midwest Electric Manufacturing Corp, for conduit entries into sides or tops of NEMA Type 3 or NEMA Type 3R enclosures.

2.1.2.6 Interior lighting fixture outlet boxes: 4 inch octagonal pressed steel.

2.1.2.7 Exterior lighting fixture outlet boxes: Cast with threaded hubs.

2.1.2.8 Interior receptacle outlet boxes: 4 inch square by 2-1/8 inch deep, pressed steel with 4 inch square cover.

2.1.3 Conductors: Copper of the AWG size specified on the Drawings.

2.1.3.1 Conductor insulation: Type THWN/THHN or XHHW.

2.1.3.2 Direct burial cable: Type "USE," 3-conductor copper cable, 600 volt, with neoprene jacket, suitable for direct burial 3-conductor (multi-conductor assembly) cable or three single conductors. 3-conductor cable shall have neoprene jacket. Single conductors shall have polyethylene or ethylene-propylene-rubber insulation. If single conductor cable is used, the three single conductors making up the circuit must be bundled together. Each circuit shall be separately bundled at approximately 3 foot intervals. ECN-13 & 21

ECN-13 & 21

2.1.4 Concrete and Masonry Anchors: "Kwik-Bolt" manufactured by Hilti Fastening Systems.

2.1.5 Wire Pulling Compound: "Y-er Eas" manufactured by Electro Compound Company; or "Polywater" manufactured by American Polywater Corp.

2.1.6 Plastic Insulating Tape: Scotch No. 33+ manufactured by 3M Company.

2.1.7 Duct Sealing Compound: "Sealex" manufactured by Porcelain Products Co.

2.1.8 Hangers for Individual Conduits: Factory-made springable wrought steel clamps or malleable iron, split, and hinged rings. For suspended conduit, clamps or rings shall be bolted to or interlocked with threaded suspension rod.

2.1.9 Grounding Materials

2.1.9.1 Ground rod: 5/8 inch diameter by 8 feet long copperweld.

2.1.9.2 Exothermic weld: Erico Products Inc "Cadweld."

2.1.10 Sealant: Polysulfide meeting the requirements of FS TT-S-00230, Type II, Class B.

## 2.2 EQUIPMENT

2.2.1 Equipment enclosures shall meet the requirements of NEMA ICS 6-110 and be NEMA Type 1 for indoor locations and NEMA Type 3R for outdoor locations.

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2.2.2 Panelboard: Ratings as shown on panelboard schedule, UL labeled, and meeting the requirements of NFPA 70 (NEC), NEMA PB 1, and FS W-P-115, Class 1, Type 1.

2.2.2.1 Provide with main circuit breaker.

2.2.2.2 Provide doors with flush type combination catch and locks, keyed alike and furnished with 2 keys for each panelboard. Provide each panelboard with directory card holder and typewritten card for branch circuit load identification. Circuit identification shall include the load description and location.

2.2.2.3 Branch circuit breakers: Molded case bolt-on type with thermal magnetic trips, meeting the requirements of FS W-C-375. Number, rating, and arrangement are shown on panelboard schedule. Permanently number branch circuits. Number tabs shall not be attached to, or be part of, circuit breaker.

2.2.2.4 Branch circuit breaker positions marked "space": Bussed for future circuit breakers. Provide removable single-pole filler plates for spaces shown on panelboard schedule.

2.2.3 Lighting Fixtures: Furnish with parts and fittings necessary to install in accordance with manufacturer's written instructions.

2.2.3.1 Fixtures of each type described shall be of one manufacturer and identical finish and appearance.

2.2.3.2 Fluorescent fixture ballasts: High power factor type, rated for voltage shown in this Section, suited for fixture temperature environment, and provided with automatic resetting thermal protector. Ballasts shall meet the requirements of ANSI C82.1.

2.2.3.3 Lighting fixtures shall be as follows:

a. Type A: 8 foot, 120 volt, 2 lamp, 800 milliampere, heavy-duty industrial fluorescent fixture with high gloss baked white enamel reflector and 2 F96T12HO cool white lamps, Lithonia Catalog No. AF10 296HO with ballast rated for operation at 0 F.

b. Type B: Surface-mounted, 120 volt, 150 watt incandescent fixture with clear glass heat resistant globe; Appleton Type V-51 with 100 watt lamp.

c. Type H: 18 watt, 120 volt, low-pressure sodium fixture for exterior wall mounting. The fixture shall have clear prismatic lens and bronze finished aluminum housing. Fixture shall be Philips Catalog No. 153452 with photocell.

d. Emergency lights: Fully automatic, 120 volt, solid-state, maintenance free, with 2 sealed beam lamps, high-low rate charger, and 6 volt sealed pure-lead battery. Cabinet shall be standard bronze hammertone. Provide a metal mounting bracket for wall mounting. Dual-Lite Company Catalog No. AS-160-BC.

e. Type R: Radiation alarm light. Rotating flashing beacon, 120 volt, with red dome and 75 watt sealed beam spot lamp, Federal Signal Corp: Model 27S.

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2.2.4 Toggle Switch Assembly: Two, single-pole, specification grade, 277 volt, 20 ampere switches mounted in cast FS box. Cover shall be cast alloy with external operating mechanisms; Crouse-Hinds Catalog No. DS1812.

2.2.5 Receptacles: Duplex, brown, specification grade, rated 15 ampere, 120 volt, 3 wire, grounding type, meeting the requirements of NEMA WD 1 Designation 5-15R with screw terminals arranged for side wiring. Self-grounding receptacles may be used instead of ground requirements specified.

2.2.6 Exit Signs: Self-luminous panels powered by tritium-filled pyrex tubes requiring no external power supply. Tubes shall be rated for 12 years (minimum) useful life and be replaceable. Signs shall consist of 6 inch white letters on green background. Provide surface-mounted units as shown on the Drawings. Units shall be ~~Moduglo Series 700A as manufactured by Self-Powered Lighting Inc., Elmsford, NY.~~ *Betalux-E Series 171 as manufactured by Saunders-Roe Developments, Inc., Winston-Salem, N.C.*

ECN-18

ECN-19

2.2.7 Safety Switches: Meeting the requirements of NEMA KS 1, heavy-duty Type HD, horsepower rated for 250V ac, 30 ampere, 2 pole, fusible unless otherwise noted on the drawings. Fuses shall be cartridge type, dual element, UL Class K5, and meet the requirements of ANSI C97.1.

2.2.8 Nameplates: Laminated plastic, white with black core, with beveled edges, sized to meet legend requirements. Engraved manufacturer's standard nameplates may be used if equal quality and legibility.

### PART 3 - EXECUTION

#### 3.1 PREPARATION

3.1.1 Field Measurements: Scale dimensions on Drawings show desired and approximate location of equipment; actual locations, distances, and levels shall be governed by field conditions.

#### 3.2 INSTALLATION

##### 3.2.1 General

3.2.1.1 Perform work in accordance with NFPA 70 (NEC).

3.2.1.2 Fasten equipment to structural members of building or metal supports attached to structure or to concrete surfaces.

a. Use clamping devices for attaching to structural steel, or, when clamping is impracticable, obtain written authority from KEH to weld to, drill or cut structural members to provide attachment.

b. Fasten equipment to concrete or masonry with expansion anchors.

c. Attach to drywall by screws into studs and to metal panels by weld studs, bolts, or self-tapping metal screws.

d. Locate equipment, boxes, and conduit approximately where shown in relation to equipment served.

e. Do not install conduit and boxes in positions that interfere with work of other trades.

f. See Section 02200 and the Drawings for underground cable and conduit installation.

g. Attach nameplates on or near equipment with clear RTV silicone sealant.

### 3.2.2 Grounding Systems

3.2.2.1 Underground conductors, electrodes, and connections: Install in accordance with the Drawings. Make joints connecting copper and galvanized steel conductors abovegrade and in dry location.

3.2.2.2 System and equipment grounding: Solidly ground neutral conductor of 3 wire, single-phase distribution systems. Ground equipment in accordance with NFPA 70 (NEC).

3.2.2.3 Static grounding: Ground building steel as shown on the Drawings.

### 3.2.3 Conduit

3.2.3.1 Use rigid steel where subject to mechanical damage, installed exposed to weather, or installed 4 feet or less above floor. Electrical metallic tubing may be used elsewhere, when connecting electrical equipment 2 feet or less apart, and when entering top of electrical equipment 4 feet minimum above floor.

3.2.3.2 Install exposed conduit parallel with or at right angles to building lines. Where conditions permit, maintain continuous exposed horizontal runs along walls at minimum height of 9 feet above floor level or grade.

3.2.3.3 Make elbows, offsets, and bends uniform and symmetrical. Bend conduit with approved bending devices.

3.2.3.4 Cut square, ream, and remove burrs. Conduit shall be clean, dry, and free of debris. Immediately after installation, plug or cap exposed ends with standard accessories until wires are installed.

3.2.3.5 Use galvanized steel locknuts and insulated bushings for attachment to enclosures except threaded hubs or sealing type locknuts shall be used outdoors or where moisture is present. Threadless fittings will not be permitted for rigid conduit. Use Erickson type couplings where required. Do not use running threads.

3.2.3.6 Use single-hole clamps equipped with clampbacks or Unistrut with clamps to secure conduits.

3.2.3.7 Install without moisture traps wherever possible. Where practicable, provide drain holes in pullboxes or fittings at low points in raceway systems and remove burrs from drilled holes.

#### 3.2.3.8 Flexible conduit

a. Use to make connections to motors and other equipment subject to vibration. Use liquidtight flexible metal conduit where conduit and fittings are installed outdoors or exposed to moisture or chemical fumes indoors.

b. Use in lengths not exceeding 4 feet for other equipment with approval of KEH.

3.2.3.9 Seal opening around conduit at exterior wall penetrations using specified sealant. Make seal waterproof and finish sealant flush with surrounding wall surface.

3.2.3.10 Use hangers with 3/8 inch rods for 2 inch conduit and smaller and hangers with 1/2 inch rods for 2-1/2 inch conduit and larger. If conduit is suspended on rods more than 2 feet long, rigidly brace to prevent horizontal motion or swaying.

3.2.3.11 Apply duct sealing compound after installation of conductors, at boxes, in conduits that penetrate walls.

3.2.3.12 For conduit extended belowgrade use PVC coated rigid steel installed in accordance with manufacturer's written instructions. Repair coating, damaged during handling or installation, using PVC paint recommended by conduit manufacturer.

#### 3.2.4 Boxes, Enclosures, and Wiring Devices

3.2.4.1 Install boxes firmly in position and plumb.

3.2.4.2 Install extension ring with blank cover on flush-mounted junction boxes where box serves permanently installed equipment.

3.2.4.3 Flush mount junction boxes served by concealed conduit.

3.2.4.4 Install dust covers on junction, pull, outlet boxes, and other types of wiring outlets at initial installation. Do not remove dust covers until wires are installed and permanent cover or device is placed on box or outlet.

#### 3.2.5 Conductors

3.2.5.1 Maximum pulling tension on conductors: As recommended by manufacturer.

3.2.5.2 Color coding: Single conductors shall be color coded as follows:

Hot No. 1	=	Blue or Black
Hot No. 2	=	Red
Neutral	=	White or Gray
Equipment Ground	=	Green

3.2.5.3 Maintain phase color coding for all branch and feeder circuits up to and including equipment connections.

3.2.5.4 Use lubricant recommended by cable manufacturer, or wire pulling compound specified, to decrease friction when pulling wire and cable through conduit.

3.2.5.5 Do not install or handle wires with thermoplastic insulation or jacket when ambient temperature is 15 F or below.

3.2.5.6 Install direct burial cable in accordance with the Drawings.

3.2.6 Splices, Taps, and Cable Terminations

3.2.6.1 Make splices and taps in building wire with solderless connectors described in Paragraph 2.1.1. Use connectors in accordance with manufacturer's written instructions.

3.2.6.2 Use plastic insulating tape for uninsulated splices and taps. Apply tape to thickness at least equal to conductor insulation. Where bolted splice or connection presents irregular surface, apply insulating putty to joints before taping.

3.2.6.3 Use crimp-on type ring or spade lugs with turned up legs for wire terminations of stranded conductors to binder screw or stud type terminals. Lugs shall have insulated sleeves.

3.2.7 Lighting Fixtures: Mount suspended lighting fixtures where shown on the Drawings using rods or chain.

3.2.8 Motor-Operated Equipment: Connect in accordance with the Drawings, this Section, and manufacturer's written instructions. Install wiring to devices which do not appear on the Drawings but are included in installation shown on the manufacturer's Drawings.

3.3 FIELD QUALITY CONTROL

3.3.1 Testing, General

3.3.1.1 Test equipment and wiring installed before attempt is made to operate equipment. Resistance, current and voltage measurements may be made as work progresses. Maintain systematic record by using schedule or chart



of tests and measurements. Provide space to record readings, dates, and witnesses. Notify KEH before start of required tests. Correct items found, during testing or examination by KEH to be at variance with the Drawings and Specifications. Deliver test reports to KEH weekly as completed.

3.3.1.2 Furnish instruments, labor, and equipment required to conduct testing.

3.3.1.3 Use test instruments which bear valid calibration stamp showing date of calibration and expiration date of stamp. Calibration and accuracy of test instruments shall be certified by independent testing laboratory having standards traceable to the National Bureau of Standards.

3.3.1.4 In addition to testing specified to be performed by Contractor, installation will be subject to examination by KEH for conformance with design and applicable codes. Assist KEH as requested.

3.3.2 Motors

3.3.2.1 Check for correct rotation.

3.3.2.2 Measure and record voltage and current, and verify value agrees with data on nameplate.

3.3.3 Wiring Systems

3.3.3.1 Test wiring operating less than 150 volts to ground for continuity and unintentional grounds. Resistance shall not exceed one ohm on continuity checks.

3.3.3.2 Contractor may elect to group and connect together conductors within raceway while performing megger test. Record readings which indicate less than minimum acceptable value. Repeat megger test after replacement of defective wiring.

3.3.3.3 Reconnect devices disconnected during testing.

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W-033-C2  
As-Built Rev 1

**KEH-115 (3-82)**

SECTION 16720

ALARM AND DETECTION SYSTEMS

PART 1 - GENERAL

1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

1.1.1.1 American National Standards Institute (ANSI)

ANSI C80.1-1983

American National Standard for  
Rigid Steel Conduit--Zinc Coated

1.1.1.2 Factory Mutual System (FM)

1988 Edition

Approval Guide

1.1.1.3 Federal Specifications (FS)

W-F-406C

Fittings For Cable, Power,  
Electrical And Conduit, Metal,  
Flexible

TT-S-00230C,  
Including AMD 2

Sealing Compound: Elastomeric  
Type, Single Component (For  
Caulking, Sealing, And Glazing  
In Buildings And Other  
Structures)

WW-C-566C

Conduit, Metal, Flexible

1.1.1.4 Federal Standards (FED STD)

FED-STD-595A, Including  
CHGS NOT 1, 2, 3, 4, 5,  
6, 7, 8 And 9

Colors

1.1.1.5 National Electrical Manufacturer's Association (NEMA)

Standards Publication/  
No. FB 1-1983 w/Rev through  
Sep 1984

Fittings and Supports for  
Conduit and Cable Assemblies

Standards Publication/  
No. ICS 6-1983 w/Rev through  
Oct 1985

Enclosures for Industrial  
Controls and Systems

Standards Publication/  
No. RN 1-1980

Polyvinyl-Chloride Externally  
Coated Galvanized Rigid Steel  
Conduit and Electrical Metallic  
Tubing

1.1.1.6 National Fire Protection Association (NFPA)

NFPA 70

National Electrical Code,  
1987 Edition

NFPA 72B

Standard for the Installation,  
Maintenance and Use of Auxiliary  
Protective Signaling Systems for  
Fire Alarm Service, 1986 Edition

NFPA 1221-1988

Standard for the Installation,  
Maintenance and Use of Public  
Fire Service Communication  
Systems

1.1.1.7 Underwriters Laboratories, Inc (UL)

May 1988

Electrical Appliance and  
Utilization Equipment Directory

May 1988

Electrical Construction  
Materials Directory

January 1988, Including  
July 1988 Supplement

Fire Protection Equipment  
Directory

UL 38-1981 w/Rev through  
Sep 1981

Standard for Manually Actuated  
Signaling Boxes for Use With  
Fire-Protective Signaling Systems

UL 797-1977

Standard for Electrical Metallic  
Tubing

UL 1242-1985

Standard for Intermediate Metal  
Conduit

1.2 SUBMITTALS: Refer to Section 01300 for submittal procedures.

1.2.1 Approval Data: Submit information listed in Column 5 of Vendor  
Data List in this Section.

1.3 QUALITY ASSURANCE

1.3.1 Standards: Products shall be identified for intended purpose by  
UL in the Electrical Appliance and Utilization Equipment Directory or  
Electrical Construction Materials Directory and bear listing mark of

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laboratory.

1.3.1.1 Use fire alarm equipment listed in UL Fire Protection Equipment Directory or FM Approval Guide bearing mark of listing organization.

1.3.1.2 Fire alarm system design, components, and installation shall meet the requirements of NFPA 70 (NEC), 72B, and 1221.

## PART 2 - PRODUCTS

### 2.1 - MATERIALS

2.1.1 Solderless Connectors and Terminal Lugs: Pressure type, rated for use with copper or aluminum conductors, and used in installations not exceeding 600 volts between conductors. Connectors with insulating caps or covers shall be rated for system utilization voltage. Connectors shall be types specified below:

2.1.1.1 Ideal Industries, Inc "Crimp Connectors."

2.1.1.2 Thomas and Betts Company "Sta-Kon."

2.1.2 Raceways, Fittings, and Boxes

2.1.2.1 Conduit shall meet the requirements of appropriate standard as follows:

- |                                     |             |
|-------------------------------------|-------------|
| a. Rigid steel                      | ANSI C80.1  |
| b. Intermediate metal               | UL 1242     |
| c. Electrical metallic tubing (EMT) | UL 797      |
| d. Flexible metal                   | FS WW-C-566 |

2.1.2.2 PVC coating on rigid steel conduit shall be factory applied and meet the requirements of NEMA RN 1, Type A-40.

2.1.2.3 Conduit fittings for rigid steel and EMT shall meet the requirements of NEMA FB 1. Only compression type threadless fittings shall be used with EMT.

2.1.2.4 Fittings used with flexible metal conduit shall meet the requirements of FS W-F-406 and be squeeze type only. Flexible metal conduit shall have integral ground conductor.

2.1.2.5 Conduit entries into sides or tops of NEMA Type 3 or NEMA Type 3R enclosures shall be made with "Myers" type watertight fittings, or sealing locknuts as manufactured by Midwest Electric Manufacturing Corp.

2.1.2.6 Exterior junction boxes shall be gasketed and watertight.

2.1.3 Conductors: Stranded copper of type and AWG size shown on the Drawings.

2.1.3.1 Conductor sizes #2 AWG and smaller shall be Type THWN/THHN except Type TW may be used for lighting circuits and ground wires.

2.1.4 Wiremarkers: Imprinted tubular plastic manufactured by ECP Corporation, Cleveland, OH; or Floytag of Seattle, WA.

2.1.5 Wire Pulling Compound: "Y-er Eas" manufactured by Electro Compound Company.

2.1.6 Tape

2.1.6.1 Plastic insulating tape: Scotch No. 33+ manufactured by 3M Company.

2.1.6.2 Conduit protection tape: Scotchrap No. 50 manufactured by 3M Company.

2.1.7 Duct Sealing Compound: "Duct Seal" manufactured by Porcelain Products Co; or "Kerite" manufactured by Kerite Co.

2.1.8 Hangers for Individual Conduits: Factory-made springable wrought steel clamps or malleable iron, split and hinged rings. For suspended conduit, clamps or rings shall be bolted to or interlocked with threaded suspension rod.

2.1.9 Sealant

2.1.9.1 Polysulfide: Meeting the requirements of FS TT-S-00230, Type II, Class B.

2.1.10 Insulating Putty: "Scotchfil" manufactured by 3M Company; GE No. 8389 manufactured by General Electric Co; or "Airseal" manufactured by Kearney Co.

2.2 EQUIPMENT

2.2.1 Fire alarm equipment enclosures shall meet the requirements of NEMA ICS 6-110 and be Type 1.

2.2.2 Manual Fire Alarm Stations: Double-action, noncoded, nonself-restoring type with single-pole, single-throw positive action contacts. Stations shall meet the requirements of UL 38 and be for indoor surface mounting with hinged type cover and finished "Signal Red."

2.2.3 Room Low Temperature Supervisory Switch: Normally closed SPST, opens below 40 F, and not adjustable, Potter Electric Signal Co, Model RTS.

2.2.4 Fire Alarm Locator Lighting Fixture: Locator light No. 332-8N5 outdoor lighting fixture, incandescent, Type N, Crouse-Hinds Vaportight Catalog No. VG175 with VN75 red glass globe, V911 guard VXF10 outlet box, and 25 watt incandescent lamp extended service type.

### PART 3 - EXECUTION

#### 3.1 PREPARATION

3.1.1 Field Measurements: The Drawings show general layout of complete system including arrangement of equipment. Verify scale dimensions since actual locations, distances, and levels shall be governed by field conditions.

#### 3.2 INSTALLATION

##### 3.2.1 General

3.2.1.1 Perform work in accordance with NFPA 70 (NEC), 72B, and 1221.

3.2.1.2 Fasten equipment to structural members of building or metal supports attached to structure.

a. Use clamping devices for attaching to structural steel or, when clamping is impracticable, obtain written authority from KEH to weld to, drill, or cut structural members to provide attachment.

b. Attach to drywall by screws into studs and to metal wall panels by bolts or self-tapping metal screws.

c. Locate equipment, boxes, and conduit approximately where shown in relation to equipment served.

d. Do not install conduit and boxes in positions that interfere with work of other trades.

e. Identify components by number and function shown on the Drawings.

f. Attach nameplates on or near component.

3.2.1.3 Use appropriate special tools when installing devices for which special installation tools are recommended by manufacturer.

3.2.1.4 The primary power for the radio fire alarm master box shall be obtained from the power panelboard as shown on the Drawings. The circuit breaker shall be red, fitted with a suitable guard (requiring the removal of a screw to open) and use only for fire alarm equipment. Label circuits used in the power panelboard.

3.2.2 Conduit

3.2.2.1 Use rigid steel or intermediate metal where subject to mechanical damage, installed in concrete floors, installed exposed to weather, or installed 10 feet or less above floor. Electrical metallic tubing may be used elsewhere when connecting electrical equipment 2 feet or less apart and when entering top of electrical equipment 5 feet minimum above floor.

3.2.2.2 Install concealed conduits as directly as possible and with bend radii as long as possible. Install exposed conduit parallel with or at right angles to building lines. Where conditions permit, maintain continuous exposed horizontal runs along walls at minimum height of 9 feet above floor level or grade.

3.2.2.3 Permanently label or mark at both ends with conduit number, wire number, run number, and color code of each wire shown on the Drawings.

3.2.2.4 Make elbows, offsets, and bends uniform and symmetrical. Bend conduit with approved bending devices.

3.2.2.5 Cut square, ream, and remove burrs. Conduit shall be clean, dry, and free of debris. Immediately after installation, plug or cap exposed ends with standard accessories until wires are pulled.

3.2.2.6 Use galvanized steel locknuts and bushings for attachment to enclosures except threaded hubs may be used where permitted by NFPA 70 (NEC). Threadless fittings will not be permitted for rigid conduit. Use Erickson type couplings where required. Do not use running threads.

3.2.2.7 Use one-hole clamps equipped with clampbacks to secure conduits.

3.2.2.8 Install without moisture traps wherever possible. Where practicable, provide drain holes in pullboxes or fittings at low points in systems and remove burrs from drilled holes.

3.2.2.9 Use flexible conduit to make connections to equipment subject to vibration. Use liquidtight flexible metal conduit where conduit and fittings are installed outdoors or exposed to moisture or chemical fumes indoors. Flexible conduit may be used in lengths not exceeding 4 feet for other equipment with approval of KEH.

3.2.2.10 Set up joints in conduit installed in concrete, underground, or exposed to weather, with high temperature, antiseize, conductive thread lubricant and sealant.

3.2.2.11 Seal opening around conduit at exterior wall penetrations and penetrations of walls which form boundaries between adjoining ventilation zones using specified sealant. Make seal waterproof and finish sealant flush with surrounding wall surface.

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3.2.2.12 Use hangers with 3/8 inch rods for 2 inch conduit and smaller. If conduit is suspended on rods more than 2 feet long, rigidly brace to prevent horizontal motion or swaying.

3.2.2.13 Apply duct sealing compound in conduit at box or enclosure nearest exterior wall penetrations on both sides of wall.

3.2.2.14 Where routing is parallel with hot water or steam pipes, keep conduit at least 6 inches from pipe covering. Where not parallel with pipe it is acceptable to run closer than 6 inches, providing conduit does not touch pipe covering.

3.2.2.15 Install PVC coated rigid steel conduit in all underground locations in accordance with manufacturer's written instructions. Repair coating damaged during handling or installation using PVC paint recommended by conduit manufacturer.

### 3.2.3 Boxes, Enclosures, and Wiring Devices

3.2.3.1 Install boxes firmly in position and plumb.

3.2.3.2 Install extension ring with blank cover on flush-mounted junction boxes where box serves permanently installed equipment.

3.2.3.3 Flush-mount junction boxes served by concealed conduit.

3.2.3.4 Install dust covers on junction, pull, outlet boxes, and other types of wiring outlets at initial installation. Do not remove dust covers until wires are installed and permanent cover or device is placed on box or outlet.

3.2.3.5 Paint junction box covers and conduit ell fittings with red enamel, Color 11105 in accordance with FED STD 595. Place 1 inch high letters "FA," in white, on center of covers.

3.2.3.6 Use watertight fittings for conduit entry into radio fire alarm box.

### 3.2.4 Conductors

3.2.4.1 All fire alarm conductor insulation shall be orange colored.

3.2.4.2 Identify each conductor as shown on the Drawings with wire markers at splice or terminal point. Attach wire marker within 2 inches of wire termination. Marker legends shall be visible without moving wire or marker.

3.2.4.3 Use lubricant recommended by cable manufacturer, or wire pulling compound specified, to decrease friction when pulling wire and cable through conduit.

3.2.4.4 Do not install or handle wires with thermoplastic insulation jacket when ambient temperature is 15 F or below.

### 3.2.5 Devices

3.2.5.1 Surface mount pull stations 4'-6" above floor at locations shown on the Drawings.

3.2.5.2 Mount low temperature switch at 4 feet above floor level.

3.2.6 Cable Terminations: Use crimp-on type spade lugs for wire terminations of stranded conductors to binder screw or stud type terminals. Spade lugs shall have upset legs and insulation sleeves sized for conductors.

## 3.3 FIELD QUALITY CONTROL

### 3.3.1 Testing, General

3.3.1.1 Test equipment and wiring installed before attempt to make to operate equipment.

3.3.1.2 Furnish instruments, labor, and equipment required to conduct testing.

3.3.1.3 In addition to testing to be performed by Contractor, installation will be subject to examination by KEH for conformance with design and applicable codes. Assist KEH as requested.

3.3.2 Wiring Systems: Test fire alarm circuits for continuity.

3.3.3 Acceptance Testing: Operability of fire alarm modifications shall be verified by Acceptance Test Procedures (ATP) No. 4700, 4701, 4702, 4703, 4704, 4718, 4719, 4720, 4721, 4722, and 4723 which are part of the design package. Perform ATPs in presence of KEH.

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**W033C2.AB**

Project No.

**W-033 through W-037**

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## RMW Storage Facilities

**KAISER ENGINEERS  
HANFORD**

## VENDOR DATA LIST

("X" Indicates Required Data)

[illegible]

END OF SECTION

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W-033-C2  
As-Built Rev I

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APPENDIX 4A-2

CONSTRUCTION SPECIFICATION V-W033C1-001, AS-BUILT  
REV. 1, FOR RADIOACTIVE MIXED WASTE  
STORAGE FACILITY

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3  
4  
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V-W033C1-001/V-CR0511C1-001  
AS-BUILT REV. 1

CONSTRUCTION SPECIFICATION FOR  
RADIOACTIVE MIXED WASTE STORAGE FACILITY  
FOR

Original Issue: 11-04-88

Prepared By:

KAISER ENGINEERS HANFORD COMPANY  
Richland, Washington

For the US Department of Energy

Contract DE-AC06-87RL10900

OFFICIAL RELEASE  
BY WHC  
DATE NOV 12 1990

Sta #10

<u><i>J. E. Walling</i></u>	<u>8-29-90</u>
Client Concurrence	Date
<u><i>J. Henderson</i></u>	<u>9/12/90</u>
Project Manager	Date
<u><i>J. E. Edwards</i></u>	<u>9-10-90</u>
Lead Engineer	Date
<u><i>[Signature]</i></u>	<u>8/16/90</u>
Field Concurrence	Date
<u><i>M. Delaune Kubenski</i></u>	<u>7-31-90</u>
Checked By	Date
<u><i>R. J. Bantemper</i></u> <u>7/31/90</u>	<u>7/31/90</u>
Prepared By	Date

ECNs affecting specification:

ECN W-033-4, W-034-1, W-035-1, W-036-2, W-037-2

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Table of

Contents - i

ECN W-033-30

This Page

W033-C1.AB

V-W033C1-001

CONSTRUCTION SPECIFICATION FOR  
RADIOACTIVE MIXED WASTE STORAGE FACILITIES

Work Order CRO510  
CRO511  
CRO512  
CRO513  
CRO514

Prepared By:

KAISER ENGINEERS HANFORD COMPANY  
Richland, Washington

For the US Department of Energy

Contract DE-AC06-87RL10900

<u><i>DeSana</i></u> Principal Lead Engineer	<u>11-3-88</u> Date	<u><i>[Signature]</i></u> Technical Documents	<u>11-3-88</u> Date
<u><i>A. L. Minister</i></u> Safety	<u>11/3/88</u> Date	<u><i>W. Thandell</i> <i>Ray</i> <i>W.F. Ray</i></u> Environmental	<u>11-3-88</u> Date
<u><i>J. S. Breed</i></u> Quality Assurance	<u>11/3/88</u> Date	<u><i>[Signature]</i></u> Project Manager	<u>11/4/88</u> Date
WESTINGHOUSE HANFORD COMPANY			
<u><i>John B. Payne</i></u> Projects Department			<u>11/4/88</u> Date



V-CR0511C1-001

CONSTRUCTION SPECIFICATION FOR  
RADIOACTIVE MIXED WASTE STORAGE FACILITIES

Work Order CR0510  
CR0511  
CR0512  
CR0513  
CR0514

Prepared By:

KAISER ENGINEERS HANFORD COMPANY  
Richland, Washington

For the US Department of Energy

Contract DE-AC06-87RL10900

<u><i>DeSauter</i></u>	<u>11-3-88</u>	<u><i>James E. Edwards</i></u>	<u>11-3-88</u>
Principal Lead Engineer	Date	Technical Documents	Date
<u><i>A. L. Minster</i></u>	<u>11/3/88</u>	<u><i>J. K. Marshall for H. P. Ray</i></u>	<u>11-3-88</u>
Safety	Date	Environmental	Date
<u><i>J. S. Breed</i></u>	<u>11/3/88</u>	<u><i>L. L. Hammons</i></u>	<u>11/4/88</u>
Quality Assurance	Date	Project Manager	Date
WESTINGHOUSE HANFORD COMPANY			
<u><i>John B. Payne</i></u>			<u>11/4/88</u>
Projects Department			Date

## TABLE OF CONTENTS

### Total Pages

#### DIVISION 1 - GENERAL REQUIREMENTS

Section 01010	Summary of Work	1
Section 01019	Items Furnished for Construction	3
Section 01025	Measurement and Payment	2
Section 01027	Application for Payment	4
Section 01040	Coordination	1
Section 01043	Jobsite Administration	3
Section 01050	Survey and Field Engineering	2
Section 01065	Permits	2
Section 01200	Project Meetings	2
Section 01300	Submittals	3
Section 01310	Progress Schedules	3
Section 01400	Quality Assurance	3
Section 01500	Construction Facilities and Temporary Controls	5
Section 01630	Product Option and Substitution	4
Section 01720	Project Record Documents	2

#### DIVISION 2 - SITEWORK

Section 02200	Earthwork	6
---------------	-----------	---

#### DIVISION 3 - CONCRETE

Section 03300	Cast-In-Place Concrete	6
---------------	------------------------	---

#### DIVISION 7 - THERMAL AND MOISTURE PROTECTION

Section 07200	Insulation	2
Section 07920	Sealants and Caulking	3

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SECTION 01010

SUMMARY OF WORK

PART 1 - GENERAL

1.1 INTRODUCTION

1.1.1 The RMW Storage Facilities are located in the 200 West Limited Area of the Hanford Site, approximately 32 miles northwest of Richland, Washington.

1.1.2 This Specification is for the construction of five building foundations and slabs and erection of five preengineered metal buildings. An alternate bid shall be made for six additional building foundations and slabs and erection of six preengineered metal buildings.

1.2 STATEMENT OF WORK

1.2.1 Work Included: The itemization included herein is intended to be broad in scope to identify major elements. The work shall include, but not be limited to, the following:

1.2.1.1 Clearing and grubbing of the area for the foundations and slabs.

1.2.1.2 Excavation and backfill required for the foundations and slabs.  
*Pouring of the foundations and slabs including the use of cold weather concreting procedures.*

ECN-4,1,2  
ECN-4,1,2

1.2.1.3 Erection of the preengineered metal buildings, including overhead coiling and personnel doors.

1.2.1.4 Installation of the stranded galvanized steel ground cable including exothermic weld.

1.3 DRAWINGS: The Drawings which describe the work covered by these Contract Documents are listed on the Schedule of Drawings.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

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SECTION 01019

ITEMS FURNISHED FOR CONSTRUCTION

PART 1 - GENERAL

1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

1.1.1.1 Code of Federal Regulations (CFR)

Title 30	Mineral Resources
Subchapter N	Metal and Nonmetal Mine Safety and Health
30 CFR 56	Safety and Health Standards-Surface Metal and Nonmetal Mines

1.2 SUBMITTALS: Not Used

1.3 GENERAL

1.3.1 Material and equipment furnished or made available to be incorporated into the Work are set forth in this Section. Other services and utilities provided are covered in other sections of this Specification.

1.3.2 Comply with provisions of Section 9 of the Contract General Conditions for all items furnished for construction.

1.3.3 Provide KEH access to the premises where items furnished for construction are stored before incorporation into the Work.

1.4 GRAVEL AND SAND

1.4.1 Gravel and sand from unmined natural deposits is available at no cost from sites designated by KEH within 4 miles of the project site. KEH makes no representation that unmined materials will meet physical properties required in this Specification.

1.4.2 If the Contractor elects to utilize the available gravel sites he shall furnish all equipment and labor required to excavate, process, load, transport, and place the gravel and sand.

1.4.3 Material from the gravel sites shall be used only for the work covered by this Specification and no gravel or sand, processed or nonprocessed, or concrete manufactured therefrom shall be transported off the Hanford Site.

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1.4.4 Access to gravel sites and travel between gravel sites and construction sites shall be on roads designated by KEH and the shall be in compliance with the requirements of Section 01500 of this Specification.

1.4.5 Operations at the gravel sites shall be in compliance with the following requirements.

1.4.5.1 Confine removal of overburden and top soil to areas marked by KEH. Stabilize blow sand areas after surface has been disturbed by blast or other approved method to prevent wind erosion.

1.4.5.2 Make no excavation or bank cut within 100 feet of ditches, paved roads, railroads, security fences, or other permanent structures.

1.4.5.3 Excavation and processing shall be in accordance with OSHA 56, Safety and Health Standards. Correct operations identified as to be hazardous to life or property.

1.4.5.4 Explosives are prohibited articles as described in OSHA 56 of the Contract General Conditions and shall not be brought to the work site or proposed for use without written KEH approval.

1.4.5.5 Temporary structures are permitted at the gravel site for offices, storage, or repair facilities necessary for the gravel removal and processing operations. No facility for habitation shall be permitted.

1.4.5.6 Use of gravel sites shall be nonexclusive. Others may enter the gravel sites to excavate material required for other work.

1.4.5.7 Upon completion of operations the gravel site shall be cleared of debris, temporary structures, and equipment. The excavated area shall be graded, banks properly sloped, and stabilized to prevent wind erosion. Conditions identified by KEH as not meeting these requirements shall be corrected before final acceptance of the Work.

1.4.5.8 The right to use the gravel sites may be terminated by KEH for failure to comply with requirements set forth herein or for abandonment of operations under this contract. The right to use the gravel site shall terminate without notice upon acceptance of Work under this Contract.

## 1.5 MATERIALS AND EQUIPMENT

1.5.1 Materials and equipment listed below will be furnished by KEH, without cost to the Contractor, for incorporation into the Work.

1.5.1.1 Basic Bid: Five 4,000 SF pre-engineered/prefabricated metal buildings including two hollow metal personnel doors, and two mechanically operated overhead coiling doors for each building. Six additional 4,000-SF preengineered/prefabricated metal buildings including two hollow metal personnel doors and two overhead coiling doors for each building will be provided for the alternate bid.

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ECN-4.1.2

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1.5.1.2 Alternate Bid: An additional six 4,000 SF pre-engineered/pre-fabricated metal buildings including two hollow metal personnel doors and two mechanically operated overhead coiling doors for each building.

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ECN-

1.5.2 Materials and equipment noted in Paragraph 1.5.1.1 are on hand and are presently stored at the KEH Warehouse, 1252 Building, 3000 Area (approximately 28 miles from the project site). Notify KEH 2 working days before-the-need-date in advance to arrange for pickup. Materials and equipment noted in Paragraph 1.5.1.2 will be delivered intermittently between March 1, 1989 and May 30, 1989.

ECN-  
ECN-

1.5.4 Furnish equipment and labor for uncrating or unpacking materials and equipment noted in Paragraph 1.5.1.1 and for handling, transportation, and performing all installation as required.

1.5.5 Other materials and equipment shown or specified in the Specifications and the Drawings required to complete the Work shall be furnished by the Contractor.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

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## MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.1 REFERENCES: Not Used.

1.2 SUBMITTALS: Not Used.

1.3 ESTIMATED QUANTITIES: The Quantities of the unit price item listed below and in the Schedule of Unit Price Item is an estimate only. The Contractor will be required to complete the work specified in accordance with the contract unit price whether it involves quantities greater or less than the following estimate: (See Article 1.5, Variations in Estimated Quantities).

<u>Item No.</u>	<u>Description</u>	<u>Unit</u>	<u>Estimated Quantity</u>
1	Cut and fill	CY	900

## 1.4 MEASUREMENT AND PAYMENT

1.4.1 It is mutually agreed that the contract price for the following items as described in Article 1.3 above and in the Schedule of Unit Price Item, shall be full compensation for furnishing all labor, materials (except for materials furnished by KEH, as specified), equipment, and for other expenses incidental to this contract. No further compensation of any kind or description will be made.

1.4.1.1 Cut and fill: Measurement will be made on a cubic yard (CY) basis for the amount of in-place material worked to attain the compacted surface elevations required. This includes material which may be required to be imported from adjacent areas or excess material exported to adjacent areas. Payment will be made at the applicable contract unit price per CY (Item No. 1). Said contract price and payment shall constitute full compensation for all costs of labor, material, and equipment to complete the requirements of the contract specification and construction drawing and as directed by KEH.

## 1.5 VARIATIONS IN ESTIMATED QUANTITIES

1.5.1 Where the quantity of a pay item in this contract is an estimated quantity and where the actual quantity of such pay item varies more than 25 percent above or below the estimated quantity stated in this contract, an equitable adjustment in the contract price shall be made upon demand of either KEH or the Contractor. The equitable adjustment shall be based upon any increase or decrease in costs due solely to the variation above 125 percent or below 75 percent of the estimated quantity.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION

ECN-4,1.2

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# SECTION 01027

## APPLICATION FOR PAYMENT

### PART 1 - GENERAL

1.1 REFERENCES: Not Used

1.2 SUBMITTALS: Not Used

1.3 FORMAT

1.3.1 Complete Form KEH-1026.00, Progress Estimate Backup (sample appended), furnished by KEH. When completing the Progress Estimate Backup, utilize the Progress Schedule pay items developed per Section 01310, Paragraph 1.3.3.

1.3.1.1 Contractor developed forms may be substituted only with prior approval of KEH.

1.3.1.2 Include the following information when requesting payment utilizing form KEH-0949.00, furnished by KEH:

Subtotal Value of All Pay Items		\$ X,XXX.XX
Completed to Date (Include all modifications)		
Allowance for Material Stored on Site:		
Previous Net Allowance	\$X,XXX.XX	
Minus Materials Placed	X,XXX.XX	
Plus Materials Stored	<u>X,XXX.XX</u>	
Net Allowance		\$ X,XXX.XX
Subtotal Value Completed to Date		\$ X,XXX.XX
Less Previous Payments	\$X,XXX.XX	
Less Other Charges from KEH	<u>X,XXX.XX</u>	
Subtotal Deductions		<u>(X,XXX.XX)</u>
Total Payment Requested		\$ X,XXX.XX
Less Retainage @ ____%		<u>(X,XXX.XX)</u>
Total Payment Allowed		\$ X,XXX.XX

### 1.4 APPLICATION PROCEDURE

1.4.1 Payments to Contractor as set forth in Section 15 of Contract General Conditions are initiated by the Contractor making an application for payment as follows:

1.4.1.1 Prepare an application for payment by completing forms furnished by KEH. Each application for payment shall include, as a minimum, a breakdown of the contract price for each item listed in Section 01310 and the percent complete for each item.

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1.4.1.2 Review the application with the KEH Field Engineer approximately 5 days before end of the pay period and adjust the data if required by the Field Engineer.

1.5 PAYMENT PROCEDURE

1.5.1 After signing the payment documents the original shall be forwarded to KEH for processing. No processing of checks will be done by KEH until the signed payment document is received.

1.5.2 KEH will mail the check to the Contractor's designated office.

1.6 ADDITIONAL DATA REQUIRED

1.6.1 When processing applications for payment and preparing payment documents, KEH may require data to substantiate and justify amounts requested. Processing of payment documents may be delayed if data is not forwarded expeditiously to KEH.

1.6.2 Requests for payment for equipment or material which the Contractor has received, but has not installed, shall be accompanied by invoice or other data to provide evidence that the title to such equipment or material is held by the Contractor.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

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## Sheet \_\_\_\_\_ of \_\_\_\_\_

**Contract No.:**

**Dated:**

[illegible]

V-W03301-C  
As-Built Rev

Contract or P.O. No.

Estimate No.

Date

Name of Contractor

Address

Nature of Work

Initial Amount of Contract

\$

Total Amount of Modifications to Date

\$

Total Adjusted Contract Amount

\$

Description

Amount

Estimated Work Completed to (Date)

Less:

Previous Payments

\$

Other Charges  
(Explain Below)

\$

Total Deductions

(\$

Adjusted Payment Requested

\$

Less Retainage @ \_\_\_\_\_%

\$

Total Payment Allowed

\$

I certify that I have verified this periodical estimate dated \_\_\_\_\_ for \$ \_\_\_\_\_ and that to the best of my knowledge and belief it is a true and correct statement of work performed and that the contractor's statement of his account and amount due him is correct and just, and the quantities included in this estimate have been performed in full accordance with the terms and conditions of the corresponding construction documents.

FOR THE CONTRACTOR

KAISER ENGINEERS HANFORD COMPANY

By \_\_\_\_\_

By \_\_\_\_\_

SECTION 01040

COORDINATION

PART 1 - GENERAL

1.1 REFERENCES: Not Used

1.2 SUBMITTALS: Not Used

1.3 CONSTRUCTION ACTIVITIES

1.3.1 Coordinate construction activities to assure efficient and orderly sequence of work, with provisions for accommodating items to be installed later.

1.3.2 As noted in Section 29 of the Contract General Conditions, other contracts may be under construction concurrently with the work included in this Specification. The Contractor shall coordinate his activities with those of other contractors for the mutual benefit of all. Coordination meetings may be required in addition to progress meetings to keep all parties informed of scheduled activities at interface points.

1.4 WORK IN EXISTING FACILITIES

1.4.1 Building Nos. 2401-W and 2402-W as well as the RMW Storage Pads are operating facilities in the vicinity of the worksite and work must be planned and scheduled to minimize interference with plant operations and to sustain the safety of operating personnel.

1.4.2 Access to the work area shall be only as directed by KEH to minimize disruptions to work force.

1.4.3 Keep work area safe and orderly for construction personnel and operating personnel. Clean work area after each work period and stack tools and materials away from traffic areas.

1.5 ACCESS TO WORK AFTER POSSESSION: Access to warranty work as set forth in Section 24 of Contract General Conditions or access to work after possession as set forth in Section 20 of Contract General Conditions will be coordinated by KEH with other contractors, and users of the facility. Notify KEH in advance of proposed work to minimize disruptions.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

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SECTION 01043

JOBSITE ADMINISTRATION

PART 1 - GENERAL

1.1 REFERENCES: Not Used

1.2 SUBMITTALS: Not Used

1.3 WORKING HOURS

1.3.1 Work shall be performed during regular day shift which is 7:30 a.m. to 4:00 p.m., Monday through Friday, excluding holidays.

1.3.2 Work other than regular day shift requires KEH approval in advance as set forth in Section 51 of Contract General Conditions.

1.4 BADGE, DOSIMETER, AND ORIENTATION: The Work is located within the Controlled Access Area and inside a Limited Area and badge, basic dosimeter requirements, and orientation will be in accordance with Section 56 of Contract General Conditions.

1.5 EVACUATION DRILLS

1.5.1 Personnel working inside Limited Area(s) are required to participate in emergency evacuation drills which are held approximately once every three months and last approximately one hour.

1.5.2 Maintain daily log or other suitable record of names of all personnel including subcontractors working inside the Limited (and Protected) Area(s).

1.6 SECURITY

1.6.1 Policy and Procedures: Contractor employees are required to comply with security policy and procedures set forth in Sections 56 and 87 of Contract General Conditions. Copies of Safeguards and Security Manual KEH-MA-6 will be provided to the Contractor upon request after award of Contract.

1.6.2 Security Escorts

1.6.2.1 Contractor personnel not having "5" or "3" security clearance, working within 200-West Limited Area require security escorts. Escorts are provided by KEH at no cost except as set forth in subparagraph 1.6.2.4.

1.6.2.2 Provide list of employees and vehicles to be used inside the Limited Area(s) and anticipated start and duration of utilization. Provide list one week before start of work in the Limited Area for escort requirement determination. Provide weekly work schedules of employees, not later than

Thursday of preceding week (minimum 24 hour notice required for changes), for KEH to provide sufficient escorts.

1.6.2.3 Escorts will be assigned from the KEH trailer located outside 200-East Limited Area near Access Gate #814. Personnel shall meet and transport assigned escorts from that location. Provide space within contractor vehicles to accommodate number of escorts required. A minimum of one escort is required in each vehicle.

1.6.2.4 The Contractor may be charged for escorts when escorts have been requested and the Contractor personnel does not show up at time and place specified. The charges will be made at the rate of \$15.00 per hour for each escort for time lost waiting for Contractor personnel.

### 1.6.3 Security Clearances

1.6.3.1 Security clearances for Contractor employees may be provided for this Work and reduce the requirements for security escorts during construction. Requests for "5" clearance will be considered under the following circumstances.

1.6.3.2 Contractor has a contract with KEH for work within a Limited Area and has a minimum of 60 calendar days of onsite work remaining when request for clearance is received.

1.6.3.3 Clearances requested are for full-time employees, including crafts, expected to be employed for duration of Contract.

1.6.3.4 A personnel security questionnaire (PSQ) shall be completed for each person requesting clearance immediately after Contract award or as soon as onsite personnel requirements are known. Personnel security questionnaire forms available upon request.

1.6.3.5 Employees that received security clearances are required to sign a Security Termination Form, furnished by KEH, and return the form with the security badge when their Work is completed or the Contract terminated.

## 1.7 SAFETY REQUIREMENTS

### 1.7.1 Fire Safety

1.7.1.1 The Contractor is required to address fire safety as part of his construction safety plan as required by Section 55 of Contract General Conditions. The following fire safety requirements are to be incorporated into the construction safety plan.

a. Portable shields shall be utilized wherever the Contractor is welding, cutting, or grinding.

b. Maintain a fire watch a minimum of one-half hour after the cessation of welding, cutting, or grinding.

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c. Fully charged fire extinguishers shall be available whenever welding, cutting, or grinding.

d. Method to control the ignition of brush fires.

e. Method to comply with requirements for off road driving and grass fire prevention given in Section 01500.

#### 1.7.2 Safety Apparel

1.7.2.1 Personnel shall wear appropriate foot wear in a recognized construction area. Tennis shoes, canvas type shoes, or open toe shoes do not meet this requirement.

1.7.2.2 Hard hats shall be worn by all personnel present at the jobsite when in operation areas other than administrative offices, lunch areas, or restrooms.

#### PART 2 - PRODUCTS

Not Used

#### PART 3 - EXECUTION

Not Used

END OF SECTION

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SECTION 01050

SURVEY AND FIELD ENGINEERING

PART 1 - GENERAL

1.1 REFERENCES: Not Used

1.2 SUBMITTALS: Not Used

1.3 QUALITY CONTROL

1.3.1 Establishing alignment, support location, and grades shall be the responsibility of a Land Surveyor registered in the State of Washington and acceptable to KEH.

1.3.2 Field notes, records, and documentation shall be available to KEH to review and verify the procedures used and the accuracy of work.

1.4 SURVEY DATA

1.4.1 Basic reference points with coordinate descriptions and bench mark with elevation identified will be located in the field by the KEH representative. Detail surveys shall be by Contractor. Contractor shall be responsible for preservation of bench marks and reference points, including stakes or other markers established until removal is authorized by KEH.

1.4.2 From information and dimensions indicated on the construction drawings, the Contractor shall perform all survey/layout as may be required by the Work.

1.5 PROCEDURES

1.5.1 Before initial layout, field verify horizontal and vertical data. Report any discrepancies to KEH before proceeding.

1.5.2 Establish an adequate number of permanent reference points to be used during construction referenced to original control points. Record locations with horizontal and vertical data on Project Record Documents.

1.5.3 Protect and preserve control points and reference points until work is complete. Report to KEH the loss or destruction of any control point. Report the relocation or change in data affecting the reference points.

1.5.4 Periodically verify data for each control point, reference point, and construction staking to maintain construction accuracy.

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PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

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## SECTION 01065

### PERMITS

#### PART 1 - GENERAL

1.1 REFERENCES: Not Used

1.2 SUBMITTALS: Not Used

1.3 FEDERAL, STATE, AND MUNICIPAL LAWS, CODES, AND REGULATIONS: Permits or licenses to do business as required by Federal, State, and Municipal laws, codes, and regulations are the sole responsibility of the Contractor as stated in Section 6 of Contract General Conditions.

#### 1.4 HANFORD SITE PERMITS

1.4.1 General: Before certain types of work can be done at Hanford, the Contractor is required to have a permit. These permits are provided by KEH at no cost to the Contractor, however, the Contractor must furnish information required and must notify KEH in advance of work for which permit is required. The Contractor shall comply with requirements and restrictions set forth in each permit.

1.4.2 Excavation: As set forth in Subsection 50.9 of Contract General Conditions no excavation shall be done without an Excavation Permit. Permit will be issued before start of construction and is for duration of the Work. Post permit at site of Work.

1.4.3 Backfill Permit: Permit required for each element of fill and backfill and good for 5 days or duration of work element provided Work does not stop for 5 consecutive days. Permit form furnished by KEH shall be completed by Contractor and returned to KEH for approval before starting work. Permit shall be kept at worksite.

1.4.4 Welding and Cutting Permit: All welding or flame cutting requires welding and cutting permit. Permit is (good for duration of Contract.) (required for each day welding or cutting is performed.) Provide welding process to be used (5 days before start of welding for KEH to furnish permit.) (each day for permit.) Permit shall be kept at worksite.

1.4.5 Oversize Load Permit: In addition to Washington State Permit, a site permit is required for each movement of oversize load or vehicle on established roads at Hanford Site. Permit will be furnished by KEH with 48 hour notice of the width, height and length of the oversized load and the proposed route of travel. The Contractor will be requested to verify the proposed route has been travelled and all limitations (especially, wire or signal height) have been identified. (See Section 01500 for vehicles requiring Oversize Load Permit, restrictions on movement, and other requirements.)

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION



SECTION 01200  
PROJECT MEETINGS

PART 1 - GENERAL

1.1 REFERENCES: Not Used

1.2 SUBMITTALS: Not Used

1.3 MEETING PROCEDURES

1.3.1 Representatives from KEH and the Contractor, including major subcontractors, shall participate in all project meetings. Representatives from Operating Contractor and DOE may attend as required by items to be discussed.

1.3.2 Meeting times and locations shall be mutually agreed to by Contractor and KEH and will be held at the Hanford Site in Richland, Washington, except informal design reviews. KEH will issue notices of meetings and prepare meeting minutes which will be distributed to project participants.

1.4 SITE LABOR CONFERENCE: Before starting construction onsite, Contractor shall attend an informational conference on Hanford Site labor requirements applicable to this project. KEH will notify the Contractor in advance that a meeting must be scheduled with representatives from labor organizations whose members may be utilized in construction. Contract General Conditions relating to labor will be reviewed.

1.5 PRECONSTRUCTION MEETING

1.5.1 Meeting will be scheduled by KEH before start of onsite work. Authorized representatives of Contractor and major subcontractors shall attend and KEH will advise others having an interest in the Work. Meeting will be chaired by KEH.

1.5.2 Following items, as a minimum, will be incorporated into agenda for meeting.

1.5.2.1 Point of contact and key personnel representing Operating Contractor, Security, Safety, QA/QC, Acceptance Inspectors, and Contract Administrators.

1.5.2.2 Schedule requirements and restraints, submittals and work limitations.

1.5.2.3 Safety, Security construction progress meetings and frequency, and certified payrolls.

1.5.2.4 Report requirements and frequency.

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1.5.2.5 Quality requirements.

1.5.2.6 Major material and equipment lists.

1.5.2.7 Other pertinent items.

#### 1.6 CONSTRUCTION PROGRESS MEETINGS

1.6.1 Meetings held weekly at time and location determined at preconstruction conference will be approximately 1 hour long.

1.6.2 KEH will chair meeting and request attendance of key personnel as required. Authorized representative of Contractor and pertinent sub-contractors shall attend.

1.6.3 Purpose of meetings is to monitor status and provide forum for exchange of pertinent information related to the Work. Major topics may include, but not be limited to, the following.

1.6.3.1 Schedule, cost, and construction status.

1.6.3.2 Design and scope changes.

1.6.3.3 Submittal status, key material and equipment delivery status.

1.6.3.4 Potential problem areas.

1.6.3.5 Inspection and testing status.

1.6.3.6 Action item status, goals for next meeting.

1.6.3.7 Other appropriate items.

1.6.4 Meeting minutes will be issued by KEH as promptly as possible following the meeting. Action items will be identified with assigned followup. Issues resolved will be reported in the minutes, as well as closed action items.

#### PART 2 - PRODUCTS

Not Used

#### PART 3 - EXECUTION

Not Used

END OF SECTION

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SECTION 01300

SUBMITTALS

1.1 DESCRIPTION

1.1.1 This Section summarizes requirements for submittal of documents defined in this Specification and describes procedures for supplemental submittals.

1.2 SUBMITTALS

1.2.1 Submittals listed in Part 1 of each Section require either review and approval or review for record.

1.2.1.1 Review and approval: Submittals shall have been approved and returned to Contractor before proceeding with procurement, fabrication, or construction.

a. Approved submittals are identified by submittal stamp with "Approved" or "Approved with Exception" box checked. "Approved" signifies general concurrence to achieve conformance with design concept of the Project and compliance with requirements of Contract Documents. "Approved with Exception" signifies general concurrence with noteworthy comments or clarifications. Approval of submittals does not relieve Contractor of responsibility for errors contained therein.

b. Submittal not approved is identified on submittal stamp as "Not Approved, Revise and Resubmit." Submittal is considered, by Architect-Engineer (A-E), to be technically deficient or incomplete and unacceptable. Resubmittal is required, hence fabrication, procurement, or performance of procedures shall not proceed.

1.2.1.2 Review for record: Contractor may proceed with procurement, fabrication, or construction, however, acceptance is contingent upon compliance with the Drawings and Specifications. Incomplete or inaccurate submittal data will be returned to Contractor with appropriate comments and items procured or work performed shall be corrected.

1.2.2 Supplemental Submittals: Submittals initiated by Contractor for consideration of "equal substitute" products or corrective procedures shall contain sufficient data for review and approval.

1.2.2.1 Equal substitute product submittals must contain outline dimensions, operating clearances, and sufficient engineering data to indicate substantial compliance with the Drawings and Specifications.

a. Identify each submittal by specification number, Section and Paragraph number; or referenced Drawing number and detail.

b. Improperly identified submittals will be returned without consideration.

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### 1.3 SUBMITTAL PROCEDURES

1.3.1 Submittals are itemized in Article 1.4 and are identified by submittal number and title. Identify each submittal by Specification number and submittal number noted in schedule. Number of copies required for retention by A-E are shown in schedule. Additional copies required for Contractor uses must be added.

1.3.2 Contractor shall review submittals before forwarding to A-E. Contractor shall sign data transmittal form showing submittal has been reviewed for compliance with Contract Documents. Contractor's signature represents he has verified materials and field measurements, and checked and coordinated information contained within submittals with requirements of Contract Documents. Only signed submittals shall be forwarded to A-E. Submittals not signed will be returned by A-E without review.

1.3.3 Delays arising out of the Contractor's failure to submit in a timely manner all required Drawings and other related data as described in the contract documents shall not constitute excusable delays for extensions, unless excusable under other provisions of the contract. The contractor shall allow 15 calendar days for KEH review and disposition of submittals (including shop drawings and vendor information) required to be furnished by the Contractor. The 15 calendar day period shall be measured from the date of receipt of the submittal in KEH's office to the date of return mailing to the Contractor.

### 1.4 SCHEDULE OF SUBMITTALS

Submittal Reference	Submittal Title	Quantity	Review and Approval	Review For Record
CONTRACT GENERAL CONDITIONS 55.2	Safety Program; Industrial Injury/ Illness Experience Equipment Certification	10	Prior to badging	
PROGRESS SCHEDULES 01310/1.2.1	Progress Schedule	10	10 days after notice to proceed	
01310/1.2.2	Weekly Work Schedule	10	Weekly	
CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS 01500/1.2.1	Anchoring and Enclosure Methods	10	Prior to mobilization	

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Submittal Reference	Submittal Title	Quantity	Review and Approval	Review For Record
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CAST-IN-PLACE CONCRETE

03300/1.2.1	Form Coating Materials	10	Before use	
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03300/1.2.2	Certification of Ready Mixed Concrete Production Facilities	10	Before mixing	
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03300/1.2.3	Concrete Materials, Mix Design and Mix Proportions	10	Before mixing	
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03300/1.2.4	Cold Weather Concreting	10	Before mixing	
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03300/1.2.5	Curing Procedure	10	Before mixing	
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SEALANTS AND CAULKING

07920/1.2.1	Manufacturer's Installation Instructions	10	Before use	
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SECTION 01310  
PROGRESS SCHEDULES

PART 1 - GENERAL

1.1 REFERENCES: Not Used

1.2 SUBMITTALS

1.2.1 Rate of Progress Schedule: Submit schedule as required in this Section.

1.2.2 Weekly Work Schedule: Submit schedule as required in this section.

1.3 RATE OF PROGRESS SCHEDULES

1.3.1 A progress schedule as identified in Section 5 of Contract General Conditions shall be submitted for approval, in accordance with the following.

1.3.1.1 If the duration of the Contract is 120 calendar days or less, the schedule shall be submitted within 10 calendar days after receipt of notice to proceed.

1.3.1.2 The progress schedule shall show the order in which the Contractor proposes to carry on the work, the dates on which it will start the several salient features of the work, including procurement of materials and equipment, and contemplated dates for completion. Each schedule shall be in the form of a horizontal bar chart of suitable scale to indicate the percentage of work scheduled for completion at any time with a separate bar for each activity. At the end of each week or at the end of such other periods of time specified in the Contract, the Contractor shall prepare and submit one copy of such chart showing the actual progress at the end of such period.

1.3.2 Organize the schedule to show activities relative to each major subcontractor and supplier. Provide sub-schedule to define critical portions of the entire schedule.

1.3.3 The progress schedule shall include design activities and milestones, delivery date of design documents. Construction activities, progress milestones, and include, but not be limited, to the following activities.

- a. Bond and insurance
- b. Submittal schedule
- c. Mobilization
- d. Survey

- e. Clearing
- f. Excavation
- g. Footings
- h. Form foundation walls
- i. Pour foundation walls
- j. Erect building structural
- k. Erect building skin
- l. Install doors
- m. Grade exterior
- n. Stabilization
- o. Demobilization

1.3.5 The schedule shall show, as a minimum, the accumulated percentage of completion of each activity and total percentage of work completed as of the last workday of each month.

a. An "S" curve shall be developed from percentage of total work figures and superimposed on the Progress Schedule.

b. A dollar value or percent of total shall be shown next to each activity shown on the schedule. These figures will be the basis for determining the progress payments described in Section 01027.

#### 1.4 WEEKLY WORK SCHEDULE

1.4.1 The Contractor shall prepare and submit 2 copies of a detailed schedule of the next week's work (no later than noon of each Friday). The first weekly work schedule shall be submitted within 10 working days after receipt of the written notice of Contract award for review and approval. The schedule shall include the following as a minimum.

- a. Work description
- b. Location of work
- c. Work involving outages, overtime, weekends, etc.

#### 1.5 REVISIONS TO SCHEDULES

1.5.1 Whenever the KEH determines that there is a significant variance between actual and scheduled progress, endangering completion within the

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Contract completion time, he may require the Contractor to prepare and submit a revised progress schedule.

1.5.2 Indicate progress of each activity to date of submittal and projected completion date of each activity. Identify activities modified since previous submittal, major changes in scope, and other identifiable changes.

1.5.3 Provide narrative report to define problem areas, anticipated delays, and impact on schedule. Report corrective action taken, or proposed, and its effect, including the effect of changes on schedules of separate contractors.

1.5.4 Distribute copies of revised schedules to jobsite file, subcontractors, suppliers, and other concerned entities. Instruct recipients to promptly report, in writing, problems anticipated by projections shown in revised schedules.

1.5.5 If the Contractor fails to submit the progress schedule specified in paragraph 1.3.1 within the time prescribed, or the updated progress schedule specified in Paragraph 1.5.1, within the requested time, the KEH may withhold approval of progress payments until such time as the Contractor submits the required progress schedules.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

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SECTION 01400  
QUALITY ASSURANCE

PART 1 - GENERAL

1.1 REFERENCES: Not Used

1.2 SUBMITTALS: Not Used

1.3 INSPECTION AND TESTING

1.3.1 Performance by Contractor

1.3.1.1 Inspection and testing to be performed by the Contractor shall be as stated in Section 19 of Contract General Conditions and including, but not limited to, the following specific inspection activities:

a. Concrete preplacement, placement, curing (pour slip).

1.3.2 Performed by KEH: In accordance with Section 19 of Contract General Conditions KEH or its designated representative will perform inspections and tests as follows:

a. Specific inspection points.

b. Final Acceptance Inspection.

c. Testing to determine moisture-density relations and field in-place density of soils.

d. Preparation, collecting, and testing of concrete and grout test specimens.

1.3.3 Specific Inspection Points

1.3.3.1 The Contractor shall adhere to inspection points specified. Contractor shall assure their personnel have completed inspections of and approved portions of work in accordance with Contract requirements before notifying KEH.

a. Specific inspection points are defined as follows:

1) Construction inspection (H): Required for witnessing of specific construction features, before further construction is allowed to proceed.

2) Witness (W): Selected for inspection at option of KEH. Work may proceed upon verbal release by KEH or upon the expiration of 1 hour beyond the scheduled time of the witness.

b. Specific Inspection Points: Apply to onsite work. Except where a longer notification period is specified, the Contractor shall notify the KEH not less than 4 working hours prior to each inspection for onsite work.

1.3.3.2 The Inspection Points; Construction Inspection (H), and Witness (W) for the contract work will be for the following items and stages of work:

a. Sitework

1) Earthwork

H - All compaction procedure demonstrations (require 3 working days notice)

H - All backfilling operations

b. Concrete

1) Cast-in-place concrete

H - All placement of concrete

H - All placement of grout

c. Metal

1) Building erection

H - Initial erection at each site.

d. Doors and Windows

1) Overhead coiling door

W - Initial installation of door

1.4 NONCONFORMANCE REPORTING AND RESOLUTION

1.4.1 Three degrees of nonconformances are used to indicate noncompliance with contract requirements.

1.4.1.1 Obvious nonconformance: A corrective action is as obvious as the nonconformance not identified by tag, and normally corrected by Contractor without notification.

1.4.1.2 Open items nonconformance: May be identified by blue nonconformance report (NCR) tag, is readily correctable to meet Drawings and Specifications and does not require deviation from contract requirements or design. Can be corrected by Contractor without any additional direction, deviation, or change to Contract requirements.

1.4.1.3 Report nonconformance: May be identified by blue NCR tag or red construction hold (CH) tag, requires change to or deviation from Contract

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requirements and additional direction to Contractor. Changes or deviations must be approved by KEH. Do not proceed with portion of the Work bearing red tag until installation is determined by KEH to be in compliance with Contract requirements, or specific permission to proceed is received from KEH. Tags are not to be removed by anyone other than inspector who applied tag or by direction of inspector's supervisor.

1.4.2 Differing degrees of nonconformance require different methods of reporting, resolving, and documenting.

1.4.2.1 Obvious nonconformance: Requires documenting only if it remains at time of completion of final punchlist. Documented on final punchlist.

1.4.2.2 Open item nonconformance: Documented for verification of correction on open items list available from KEH upon request.

1.4.2.3 Report nonconformance: Documented on Construction Nonconformance Report (CNCR) or audit finding report (AFR) and requires formal approved resolution.

1.4.3 Contractor shall ensure its organization is represented by a knowledgeable individual with sufficient authority to commit Contractor to corrective action requests identified by KEH.

1.4.4 Nonconformances noted during performance of Contract, require resolution before completion and final payment.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

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## SECTION 01500

### CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

#### PART 1 - GENERAL

##### 1.1 REFERENCES

###### 1.1.1 National Fire Protection Association (NFPA)

NFPA 701-1977

Standard Method of Fire Tests  
for Flame-Resistant Textiles  
and Films

###### 1.1.2 Washington State Department of Transportation (WSDOT)

M41-10-84

Standard Specification for  
Road, Bridge, and Municipal  
Construction

##### 1.2 SUBMITTALS: Refer to Section 01300 for procedures.

1.2.1 Anchoring and Enclosure Methods: Submit for review for approval the methods proposed for anchoring portable structures and enclosing the underfloor area to meet the requirements of this Section.

##### 1.3 CONSTRUCTION FACILITIES

1.3.1 First Aid: Facilities are available at the 2719WA Building in the 200-West Area to provide first line medical attention.

1.3.2 Operation and Storage Areas: The onsite operations of the Contractor including storage of materials shall be confined to area adjacent to the worksite as designated in the field by the KEH representative.

1.3.3 Disposal Site for Waste: Disposal of excess excavation, waste material, broken asphalt, and broken concrete shall be at a Site approximately 12 road miles from the project location. The disposal Site is open only during regular working hours as stated in these Contract Documents. The disposal site will not accept waste classified as hazardous material.

##### 1.4 TEMPORARY UTILITIES

###### 1.4.1 Water

1.4.1.1 Construction water: Water will be made available from an existing hydrant in the vicinity of the worksite. A 4-1/2 inch, National Standard Thread, 1/4 turn ball valve with a female swivel to a 4-inch sexless "Snap-Tite/Storz" quick connect coupling shall be connected to the 4-1/2 inch port for Fire Department use only. A reduced pressure backflow preventer, BEECO-AERGA Model 6CM or approved, and a slow-opening 2-1/2 inch gate valve shall be installed on each hydrant port intended for construction use. A slow-

opening valve will prevent water hammer. The hydrant wrench, backflow preventers and all valves shall be furnished by the Contractor. The wrench shall remain on the hydrant at all times. When used, the hydrant shall be turned "Full-on" or "Full-off". Partial opening causes damage to the hydrant. The hydrant shall be turned off at the end of each workday. The Contractor shall provide freeze protection for the hydrant and temporary piping or hoses. All temporary pipe or hose extensions shall be furnished by the Contractor. Fittings provided by the Contractor for connection to water source shall be approved by KEH prior to installation. Before final acceptance of the contract work, the Contractor shall remove all temporary piping, hoses and valves installed by him.

NOTE: Contractor is required to notify KEH prior to each opening of hydrant.

1.4.1.2 Drinking Water: Water for drinking purposes will be made available within the 200-West Area. The Contractor is responsible for furnishing adequate drinking water to his employees that conforms to health and safety requirements.

1.4.2 Electrical Power: The Contractor shall provide his own temporary power. As an option, temporary power shall be provided from an existing breaker at the RMW Storage Facilities pad-mounted transformer. The contractor will provide all necessary materials to connect temporary power. The installation shall include a ground fault circuit interrupter and conform to NEC requirements.

#### 1.4.3 Telephone

1.4.3.1 The telephone system within the Administratively Controlled Area at the Hanford Site is operated by General Telephone Company of the Northwest, Inc. Upon request of the Contractor, the KEH will arrange for telephone service at the construction offices of the Contractor and its subcontractors, if facilities for such services are available. Kaiser Engineers Hanford will charge the Contractor for installation and services in accordance with the charge assessed by General Telephone Company. Those charges will be determined on the basis of published tariffs. Information of tariffs may be obtained from DOE's Site Services Contractor, office of the Manager of the Plant Telephone and Radio, Telephone 376-6322.

1.4.3.2 All of the above charges will be deducted from payments due the Contractor. The Contractor and its subcontractors may use provided telephones for long distance calls necessary to the performance of the work. All such calls must be made by use of a valid credit card and the cost of such calls shall not be charged to the Site Services Contractor or the KEH.

1.4.4 Sanitary Facilities: The Contractor shall furnish and service chemical or other approved sanitary toilets for use of his employees. The facilities shall conform to requirements of KEH which are available upon request.

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1.5 ACCESS ROADS AND PARKING AREAS

1.5.1 Access to 200-West Area shall be through the main gate.

1.5.2 Parking for Contractor's Company vehicles will be made available in the vicinity of the worksite. "No Parking" signs are posted to indicate fire and emergency lanes. No on-street parking will be allowed nor will parking be permitted on the RMW Storage Pads.

1.5.3 Grass Fire Prevention: To reduce the potential for grass fires, all off-road driving shall be kept to a minimum. Each vehicle driving off-road or to remote locations, shall carry a portable fire extinguisher (10 pound ABC dry chemical, minimum), communications equipment consisting of a two-way radio or mobil phone (CB type radios are not acceptable) and a shovel. All fires shall be reported immediately to the nearest Hanford Patrol and the Hanford Fire Department.

1.6 TEMPORARY CONTROLS

1.6.1 Dust Control: The Contractor shall maintain all work areas to prevent a hazard or nuisance to others. Dust control shall be accomplished by sprinkling or other methods as approved by KEH. Sprinkling shall be repeated at such intervals to keep all parts of the disturbed area at least damp at all times, and the Contractor must have sufficient equipment on the job to accomplish this. Dust control shall be performed as the work proceeds and whenever a dust nuisance or hazard occurs. No separate or direct payment will be made for dust control and the cost thereof shall be considered incidental to and included in the contract price.

1.6.2 Temporary enclosures: Plastic sheeting materials used to form enclosures shall have minimum thickness of 14 mil and have fire retardant capabilities meeting the requirements of NFPA 701. Acceptable manufacturers are Winman Corporation (Plastic Division), St. Cloud, Minnesota; Lancs Industries, 1270 N.E. 124th Street, Kirkland, Washington 98034; and Protective Plastics, Inc. 230 Silver Creek Road, Greer, South Carolina 29651. Other manufacturers may be submitted to KEH for approval.

1.6.3 Traffic Control: Temporary traffic control and barricades shall be in accordance with WSDOT M41-10, Section 1-07.23(3).

1.6.3.1 Movement of Vehicles and Equipment: Slow moving vehicles and equipment shall not travel on Hanford Site roads during heavy traffic periods between 6:30 A.M. and 8:00 A.M., and 3:30 P.M. and 5:30 P.M. Vehicles and equipment shall not block existing roads or park on roadway shoulders.

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1.6.3.2 Oversize Load or Vehicle: Travel of oversized load or vehicle is restricted to the hours between 9:00 A.M. and 2:30 P.M. Site permit specified in Section 01065 is required when the load or vehicle exceeds the following dimensions:

- Width 8 feet 6 inches
- Height 14 feet
- Length 40 feet (Single unit)  
48 feet (Single trailing unit)

a. Oversized Load Identification: All vehicles or loads exceeding 8 feet 6 inches in width shall have an oversized load sign displayed on the front of the towing vehicle and on the rear of the trailing unit. Red flags shall be attached to each corner of the oversized load or vehicle.

b. Escort Vehicle(s): Escort vehicles shall be equipped with oversized load signs and amber lights. On two-lane highways, escort vehicles are required in the front and rear of a load or vehicle over 10 feet wide. For multiple-lane highways, an escort vehicle is required in the rear of a load or vehicle over 14 feet wide and on the front and rear of a load or vehicle over 20 feet wide.

c. Electrical Escort: A qualified electrical escort (journeyman lineman) is required when the load or vehicle reaches a height of 14 feet or higher from the road surface, or when a clearance of at least 6 feet cannot be maintained from overhead electrical or signal lines.

## 1.7 FIELD OFFICE

1.7.1 A field office equipped and staffed to conduct efficiently the work under this contract shall be established by the Contractor. A copy of all Drawings, Specifications and other information pertinent to the proper and efficient prosecution of the contract work shall be kept at the worksite at all times, and the authorized representative of KEH shall have access thereto at all times. Telephone service will be made available at the Contractor's field office as set forth in Paragraph 1.4.3 providing such service is available. The Contractor may utilize existing telephones at buildings to be designated in the field by KEH for local calls.

1.7.2 All portable or relocatable structures, including trailers utilized by Contractor for field offices and/or storage shall be anchored or tied down to prevent overturning and/or lateral movement in winds up to 70 mph. The underfloor area shall be enclosed or skirted with material that will not burn or support combustion. The purpose of this requirement is for prevention of wind-blown debris accumulation and the use of underfloor space for material storage. Anchoring and enclosure shall be in accordance with anchoring and enclosure methods submitted and shall be completed within 14 days of arrival onsite.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

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SECTION 01630

PRODUCT OPTION AND SUBSTITUTION

PART 1 - GENERAL

1.1 REFERENCES: Not Used

1.2 SUBMITTALS: Not Used

1.3 GENERAL

1.3.1 Products include material, equipment and systems and shall meet the requirements of the specifications and referenced standards.

1.3.2 The material and workmanship shall meet requirements of Section 13 of the Contract General Conditions.

1.3.3 Components required to be supplied in quantity within a Specification section shall be the same and be interchangeable.

1.3.4 Do not use materials and equipment removed from existing structure, except as specifically required, or allowed, by Contract Documents.

1.4 PROCEDURES

1.4.1 The Contractor is not required to obtain approval of proposed product when the product is:

1.4.1.1 Specified by reference standards or by description and the proposed product meets those standards.

1.4.1.2 Specified by naming models of manufacturers and the product is one of those specifically named.

1.4.2 The Contractor is required to obtain approval of proposed product when the product is:

1.4.2.1 Specified by naming models of one or more manufacturers and the product is not one specifically named.

1.4.2.2 Not specified by manufacture and the Specification requires specific product approval.

1.4.3 Products List

1.4.3.1 Within 10 days after date of Notice of Award transmit 5 copies of a list of major products which are proposed for installation, including name of manufacturer.

1.4.3.2 Tabulate products by Specification section number, title, and Article or Paragraph number.

1.4.3.3 For products specified only by reference standards, give manufacturer, trade name, model or catalog designation, and reference standards.

1.4.3.4 KEH will reply in writing within 10 days stating whether there is reasonable objection to listed items. Failure to object to a listed item will not constitute a waiver of specified requirements.

#### 1.4.4 Limitations on substitutions

1.4.4.1 Substitutions will not be considered when indicated or implied on fabricator drawings or product data submittals without separate formal request, when requested directly by subcontractor or supplier, or when acceptance will require substantial revision of Contract Documents.

1.4.4.2 Substitute products shall not be ordered or installed without written acceptance.

1.4.4.3 Only one request for substitution for each product will be considered. When substitution is not accepted, provide specified product.

1.4.4.4 KEH will determine acceptability of substitutions.

#### 1.4.5 Requests for substitutions

1.4.5.1 Submit separate request for each substitution using form KEH 1151.00 (sample attached). Document each request with complete data substantiating compliance of proposed substitution with requirements of Contract Documents.

1.4.5.2 Identify product by Specification Section and Article or Paragraph numbers. Provide manufacturer's name and address, trade name of product, and model or catalog number. List fabricators and suppliers as appropriate.

1.4.5.3 Attach as a minimum product data as specified in Section 13 of Contract General Conditions.

1.4.5.4 Give itemized comparison of proposed substitution with specified product, listing variations, and reference to Specifications Section and Article or Paragraph numbers.

1.4.5.5 Give quality and performance comparison between proposed substitution and the specified product.

1.4.5.6 Give cost data comparing proposed substitution with specified product, and amount of net change to Contract Sum.

1.4.5.7 List availability of maintenance services and replacement materials.

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1.4.5.8 State effect of substitution on construction schedule, and changes required in other work or products. If substituted product requires or necessitates revisions to structures, foundations, footings, services, systems, piping, electrical, etc; the cost of all engineering and construction shall be borne by the Contractor. The Contractor shall submit for approval all drawings, calculations, and vendor data which clearly indicate revisions to accommodate the substitution.

#### 1.4.6 Contract representation

1.4.6.1 Request for substitution constitutes a representation that Contractor has investigated proposed product and has determined that it is equal to or superior in all respects to specified product (or that the cost reduction offered is ample justification for accepting the offered substitution).

1.4.6.2 Contractor shall provide same warranty for substitution as for specified product.

1.4.6.3 Contractor shall coordinate installation of accepted substitute, making such changes as may be required for work to be completed in all respects.

1.4.6.4 Contractor certifies that cost data presented is complete and includes all related costs under this contract.

1.4.6.5 Contractor waives claims for additional costs related to substitution which may later become apparent.

1.4.6 Contractor waives claim for additional performance time resulting from product substitution.

#### 1.4.7 Submittal

1.4.7.1 Submit 5 copies of request for substitution.

1.4.7.2 KEH will review Contractor's request for substitutions with reasonable promptness.

1.4.7.3 For accepted products, submit fabricator drawings, product data, and samples as required in Section 01300.

#### PART 2 - PRODUCTS

Not Used

#### PART 3 - EXECUTION

Not Used

From (Contractor) \_\_\_\_\_ Contract No. \_\_\_\_\_

Project \_\_\_\_\_

Description of Proposed Substitution \_\_\_\_\_

We hereby submit for consideration the following product instead of specified item for above project:

Specification No. \_\_\_\_\_ Section \_\_\_\_\_

Drawing No. \_\_\_\_\_ Section or Zone \_\_\_\_\_

Specified Item \_\_\_\_\_

Proposed Substitution \_\_\_\_\_

Attach complete technical data, including laboratory tests and samples, as applicable.

Provide detailed comparison of the significant qualities (system performance, interface requirements, size weight, durability, performance and similar characteristics, and including visual effect where applicable) for the proposed substitution of comparison with the original requirements.

Describe other changes to drawings and specifications required by proposal as outlined below and attach additional information as necessary.

## Complete Each Item

A. Changes to drawing dimensions \_\_\_\_\_

B. Effect of substitution on other systems \_\_\_\_\_

C. Outline differences between proposed substitution and specified item \_\_\_\_\_

D. Manufacturer's guarantees of proposed and specified items are:

\_\_\_\_\_ Same \_\_\_\_\_ Different (explain on attachment)

Undersigned attests function, and quality equality equivalent or superior to specified item and has reviewed General Conditions paragraph GC-13 for assignment of responsibility if the substitution is approved.

Submitted By

Signature

Address

Date

Phone

END OF SECTION



SECTION 01720  
PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 REFERENCES: Not Used

1.2 SUBMITTALS: Not Used

1.3 RECORD REQUIREMENTS

1.3.1 The nature of the work at the Hanford Site requires that certain documents, as defined herein, be held to record the construction process and the administration of the Contract. KEH is responsible for assembling all pertinent data for final disposition. The Contractor is responsible for preparing, preserving, and delivering those Project Record Documents to KEH required by this Contract. These documents are in addition to those submittals required in Section 01300.

1.3.2 Project Record Documents shall be marked by the Contractor to identify those copies for record and to prevent their use for construction. Record copies of construction documents shall be kept in the Contractor's Field Office and shall be available to KEH during the progress of the work.

1.3.3 Some data required for Project Records are delivered to KEH during the course of construction and contract administration, while other required records are assembled after completion of construction for delivery to KEH. In all situations the Contractor is required to document the delivery by retaining a copy of reports delivered during course of work until construction completion, retaining a copy of letter of transmittal itemizing delivered items, or other means acceptable to KEH.

1.4 PROJECT RECORD DOCUMENTS

1.4.1 General: The documents required for Project Record are itemized herein. Each document shall be identified by Title or Number and shall be complete. All notes or markings added by hand shall be legible utilizing a permanent non-smearing marking media, such as ink or felt tip markers, in contrasting color.

1.4.2 Contract Documents: One set of Drawings and the Contract Documents, including Addenda and Modifications to the Contract, shall be stored in the Field Office apart from documents used in construction and shall be maintained in a clean, dry, and legible condition. Legibly mark each item to record actual construction, including changes to dimensions and details, manufacturer's name, catalog number, and substitute products.

1.4.3 Certified Payrolls: Each week certified payrolls, as required by Section 108 of the Contract General Conditions, shall be filed with KEH and copies kept in Field Office until Contract completion. No progress payments

will be processed unless all certified payrolls for the work period have been received by KEH.

1.4.4 Weekly Manpower Report: A weekly manpower report completed daily and submitted weekly (before 10:00 a.m. on Monday for the previous week) is required during the performance period of subject contract. Forms for Contractor's use in documenting the foregoing will be furnished by KEH.

1.4.5 Backfill Permit: Retain all backfill permits approved for the work as required in Section 02200.

1.4.6 Soil Compaction Procedure: Retain all Forms KEH-382 completed for the work as required in Section 02200.

1.4.7 Pour Slips: After obtaining KEH approval of concrete pour slip required in Section 03300, give copy to KEH and retain Contractor copy until Contract closeout to forward to KEH.

1.4.8 Trip Tickets: Deliver to KEH with each truck load of concrete as required in Section 03300 and retain Contractor copy until Contract closeout and to forward to KEH.

1.4.9 Concrete Tests: If the Contractor elects to test concrete or to have independent tests performed, copies of such tests shall be given to KEH.

1.4.10 Product Samples and Manufacturer's Instructions: In addition to submittal required in Section 01300 and requirements of this Section, any information received by the Contractor from suppliers that can document products used and how they were installed shall be forwarded to KEH for Project Records.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

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SECTION 02200

EARTHWORK

PART 1 - GENERAL

1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

1.1.1.1 American Society for Testing and Materials (ASTM)

D 653-86

Standard Terms and Symbols  
Relating to Soil and Rock

1.1.1.2 Washington State Department of Transportation (WSDOT)

M41-10-84

Standard Specifications for  
Road, Bridge, and Municipal  
Construction

1.2 SUBMITTALS: Refer to Section 01300 for submittal procedures.

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 General: Obtain select soils from excavation or other designated locations. Obtain on-site approval for soils.

2.1.2 Fill or Backfill

2.1.2.1 Structural: Well graded soil mixtures which may contain cobbles up to 3 inches in greatest dimension if uniformly distributed and not constituting more than 20 percent of volume of fill.

2.1.2.2 Common: Well graded soil mixtures containing cobbles up to 8 inches in greatest dimension if uniformly distributed and not constituting more than 40 percent of volume of fill.

2.1.3 Bedding for Underground Pipe, Conduit, or Cable: Sand, defined in ASTM D 653, or excavated sandy material having less than 20 percent gravel particles and maximum dimension of 1/2 inch.

2.1.4 Plastic Sheet Marker: 6 inch wide nondetectable tape similar to "Terra Tape" manufactured by Griffolyn Co, Inc. Tape shall be imprinted with warning such as "Caution Buried Installation Below" at intervals of not more than 4 feet. Color code in accordance with the American Public Works Association uniform color code.

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PART 3 - EXECUTION

3.1 EXCAVATION

3.1.1 Before performing excavation, obtain excavation permit. Excavation permits will be furnished as set forth in Section 01065.

3.1.2 Locate and expose underground utilities by hand tools. Use of heavy equipment and machinery is subject to approval of KEH.

3.1.3 Shore excavations more than 4 feet deep and with sides sloped steeper than 1-1/2 horizontal to 1 vertical. Install shoring as excavation progresses and remove as backfilling is accomplished.

3.1.4 Do not store excavated or other material closer than 2 feet from edge of excavation unless barrier is erected to retain excavated materials. Store and maintain materials in manner that they are prevented from falling or sliding into excavation.

3.1.5 Wherever slopes of excavations will intersect existing underground lines or structures such as building foundations, underground piping, electrical ducts or direct buried electrical lines, install shoring or other means of support to prevent overstressing existing structure or underground lines or to prevent interrupting service to existing buildings.

3.1.6 Footings and Foundations

3.1.6.1 Make excavations for footings to depth shown on the Drawings or to further depth as necessary to provide undisturbed surface to receive footing. Make excavations to proper width with allowances made for forms and bracing. Make bottom of excavations compact, level, true, and free of loose material.

3.1.6.2 If over-excavation occurs where footings are designed to be placed on undisturbed earth, correct at time of placing concrete by extending concrete down to undisturbed earth, or by placement of backfill, compacted in accordance with subparagraph 3.2.1.2b, Method C.

3.2 INSTALLATION

3.2.1 Fill and Backfill

3.2.1.1 General

a. Backfill Permit: Obtain signatures required on backfill permit for each element to be filled or backfilled. Work not started within 5 calendar days from time permit is approved shall not be started until new permit has been approved. A continuing job that has not had backfill installed within past 5 calendar days will require new backfill permit.

b. Remove debris and organic matter from area to be filled or backfilled.

c. Use only select materials for fill or backfill. Keep materials free of frozen particles, lumps, organic matter and trash.

d. Do not place fill or backfill on frozen ground.

e. Filling or backfilling by sluicing or flooding with water will not be permitted.

f. Bring fill or backfill up evenly on sides of walls, structures and utility lines to avoid unbalanced loading.

g. Do not place fill or backfill against concrete structure or foundation wall less than 14 days after completion of structure or wall unless written permission from KEH (Acceptance Inspector) is obtained. Provide wall support, where noted on the Drawings, before filling or backfilling.

### 3.2.1.2 Structural

a. Before placement of fill or backfill, demonstrate, to KEH (Acceptance Inspector) by physical test at site, that procedure proposed for installation and compaction of soils will provide degree of compaction specified. Prepare "Soil Compaction Procedure" Form KEH-382 (sample appended) in accordance with printed instructions. (Forms will be furnished by KEH.)

b. Place backfill in accordance with WSDOT M41-10, Section 2-03.3(14)C and approved procedure as follows.

1) Use Method C under foundations, slabs and pipelines.

2) Use Method B under pavements and roads, and within 5 feet of buildings, fences, other structures, or poles supporting electric lines or pipe.

c. Compaction control tests will be in accordance with WSDOT M41-10, Section 2-03.3(14)D.

### 3.2.1.3 Common

a. Place fill or backfill in layers not more than 12 inches thick, loose measurement.

b. Compact each layer, full width, by at least 1 pass of vibratory or rammer type compactor, pneumatic-tired roller, loaded scraper wheel, grader wheel or power roller.

c. Mound over top layer of backfill to depth of 1 inch for each 12 inches of trench depth to maximum mound height of 6 inches.

3.2.2 Plastic Sheet Marker: Place continuous over buried utility lines. Place marker tape directly over line and 1 foot below finish grade. Place marker over each outside pipe of multiple lines. Place intermediate markers at maximum of 4 feet apart.

### 3.2.3 Finish Grading and Stabilization

3.2.3.1 Rake area disturbed by work, remove surface stones larger than 6 inches and dispose of excess material and debris at area designated by KEH.

### 3.3 FIELD QUALITY CONTROL

3.3.1 Soil Compaction Tests: Sampling and testing of compacted fill and backfill will be performed by KEH (Acceptance Inspector).

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# SOIL COMPACTION PROCEDURE

Project No.	Project Title	Date						
Contract No.	Procedure No.	Location of Demonstration						
REQUIREMENTS		EQUIPMENT DEMONSTRATED						
A	Applicable Spec./Dwg.	Type						
	Compaction Required %	Manufacturer						
	Maximum Lift Size	Model						
LABORATORY SOIL TEST RESULTS								
B	<input type="checkbox"/> Non-granular Materials (WSDOT Test Method No. 609)	<input type="checkbox"/> Granular Materials (WSDOT Test Method No. 606-A)						
	COMPACTION DEMONSTRATION TEST RESULTS							
Formula for Percent Compaction: $\frac{\text{dry density}}{\text{max density}} \times 100 = \text{Percent Compaction}$								
	No. of Passes	Depth of Lift	Percent Moisture	Lbs/ft <sup>3</sup> Dry	Maximum Density	Percent Compaction	Accept	Reject
Observations or Comments								
TEST METHOD USED FOR DEMONSTRATION <input type="checkbox"/> Nuclear Gage (ASTM D2922 & D3017) <input type="checkbox"/> Sand Cone (ASTM D1556) <input type="checkbox"/> Other _____         Apparatus No. _____								
D	Contractor Representative							Date
	Government Representative							Date

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As-Built Rev 1

KEM-382

## INSTRUCTIONS

This Soil Compaction Procedure form, when approved by the Government Representative, constitutes an approved compaction procedure.

Section A is the responsibility of the Construction Contractor. It is to be completed at the time of backfill compaction demonstration and presented to the Government Representative.

Section B is completed by the Government Representative. Data entered is obtained from the agency that performs the laboratory testing.

Section C is completed by the Government Representative as the demonstration is performed. Using the applicable formula, the percent compaction achieved is determined and entered. Acceptance is based on the results as compared with the compaction percent required in Section A.

Section D is signed and dated by the Construction Contractor Representative acknowledging responsibility for this procedure and compliance thereto for applicable backfill operations. Section D is signed and dated by the Government Representative to signify approval.

END OF SECTION



SECTION 03300  
CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

1.1.1.1 American Concrete Institute (ACI)

ACI 301-84 (Revised 1985)                      Specifications for Structural  
Concrete for Buildings

ACI 305-77                                      Standard Specification for Hot  
Weather Concreting

ACI 306.1-87                                  Standard Specification for  
Cold Weather Concreting

1.1.1.2 American Society for Testing and Materials (ASTM)

A 615-87                                      Standard Specification for  
Deformed and Plain Billet-Steel  
Bars for Concrete Reinforcement

C 33-86                                        Standard Specification for  
Concrete Aggregates

C 94-86b                                      Standard Specification for  
Ready-Mixed Concrete

C 150-86                                      Standard Specification for  
Portland Cement

C 260-86                                      Standard Specification for  
Air-Entraining Admixtures for  
Concrete

1.1.1.3 National Ready Mixed Concrete Association (NRMCA)

January 1, 1976                              Certification of Ready Mixed  
(Third Revision)                              Concrete Production Facilities

1.2 SUBMITTALS: Refer to Section 01300 for submittal procedures.

1.2.1 Form Coating Materials: Submit proposed form coating materials in accordance with ACI 301, Section 4.4.

1.2.2 Certification of Ready Mixed Concrete Production Facilities: Submit current legible copy of "Certificate of Conformance for Concrete Production Facilities" issued by and bearing the seal of the National Ready Mixed Concrete Association. Certificate shall contain signature and seal of registered Civil Engineer.

1.2.3 Concrete Materials, Mix Design and Mix Proportions: Submit concrete materials, mix design and mix proportions in accordance with ACI 301, Sections 3.8 and 16.7.3. Define each material to be used in concrete and state amount, by weight, to be utilized per cubic yard of plastic mix.

1.2.4 Cold Weather Concreting: Submit detailed procedure in accordance with ACI 306.1, Section 1.5.1.

1.2.5 Curing Procedure: Submit description of materials and methods of curing in accordance with ACI 301, Section 12.2.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

#### 2.1.1 Concrete

2.1.1.1 Cement: ASTM C 150, Type II (Low Alkali)

2.1.1.2 Aggregates: ASTM C 33, maximum size 1-1/2 inch

2.1.1.3 Air-entraining admixture: Meeting the requirements of ASTM C 260: Sika Chemical Company "SIKA AER"; Chem-Masters Corp "Adz-Air"; or Protex Industries "Protex".

#### 2.1.1.4 Properties

a. Minimum allowable compressive strength: 3000 psi at 28 days.

b. Slump: 4 inch maximum in accordance with ACI 301, Section 3.5.

c. Air content: In accordance with ACI 301, Table 3.4.1.

d. Proportions: In accordance with ACI 301, Sections 3.8 and 3.9.

2.1.1.5 Mixing: In accordance with ASTM C 94.

2.1.1.6 Delivery: In accordance with ASTM C 94.

#### 2.1.2 Reinforcing Steel

2.1.2.1 Steel bars: ASTM A 615, deformed, Grade 60.

2.1.2.3 Tie wire: Black annealed steel, 16 gauge minimum.

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2.1.3 Joint Materials

2.1.3.1 Expansion joint filler: See Section 07920.

2.1.3.2 Sealant: See Section 07920.

2.1.4 Nonshrink Grout

2.1.4.1 Nonmetallic type: "Five Star Grout" by US Grout Corp; "Por-Rok" Anchoring Cement by Hallemite; or "Masterflow 713" by Master Builders.

2.1.5 Forms: Wood, steel, plywood, or Masonite Corporation "Concrete Form Presdwood", as required for various specified finishes.

PART 3 - EXECUTION

3.1 PREPARATION

3.1 Form Construction

3.1.1.1 Install formwork in accordance with ACI 301, Section 4.2. Interior shape and rigidity shall be such that finished concrete will meet the requirements of the Drawings within tolerances specified in ACI 301, Table 4.3.1.

3.1.1.2 Prepare form surfaces in accordance with ACI 301, Section 4.4.

3.1.1.3 Forms for surfaces which will be permanently concealed from view may be saturated with water before placing concrete instead of other treatment, except in freezing weather forms shall be treated with oil or stearate.

3.1.1.4 Clean forms of foreign material before placing concrete.

3.2 INSTALLATION

3.2.1 Reinforcing Steel

3.2.1.1 Fabricate bars accurately to dimensions shown on Drawings. within tolerances shown in ACI 301, Section 5.4.

3.2.1.2 Tag in accordance with bar list.

3.2.1.3 Place as shown on approved submittals within tolerances specified in ACI 301, Sections 5.4 and 5.5.

3.2.1.4 Tie to prevent displacement during placement of concrete.

3.2.1.5 Do not force into concrete after initial set has started.

3.2.1.6 Place with dimension of concrete protection equal to minimum given in ACI 301, Section 5.5, except where shown otherwise on the Drawings.

### 3.2.2 Concrete

3.2.2.1 Before ordering, obtain approval of required submittals.

3.2.2.2 Before batching, obtain approval of formwork and reinforcement by KEH (Acceptance Inspector).

3.2.2.3 Before placing:

a. Obtain approval of "Pour Slip" by KEH (Acceptance Inspector). "Pour Slip" shall include appropriate reference to specific portion of structure to be placed, maximum size of coarse aggregate, design strength, admixture, and slump. "Pour Slip" forms can be obtained from KEH (Acceptance Inspector).

b. For each truck load, deliver "Trip Ticket" to KEH (Acceptance Inspector). "Trip Ticket" shall contain information listed in ASTM C 94, subparagraphs 16.1.1 through 16.1.10, and include water/cement ratio.

3.2.2.4 Place in accordance with ACI 301, Sections 8.1, 8.2, and 8.3. Do not drop (free fall) more than 5 feet. Insert vibrator, vertically if possible, into concrete and reach small distance into concrete in next lower layer. Do not insert vibrators into lower courses that have reached initial set. Take care to avoid allowing head of vibrator to come in contact with forms or embedded items.

3.2.2.5 Temper only as permitted in ACI 301, Section 7.5.

3.2.2.6 Place nonshrink grout where shown on the Drawings and in accordance with manufacturer's recommendations.

3.2.2.7 Weather conditions: Protect concrete during placement in accordance with ACI 301, Section 8.4. Cold weather concreting shall be in accordance with approved procedure. Hot weather concreting shall be in accordance with ACI 305.

3.2.2.8 Construction joints: Make in accordance with ACI 301, Section 6.1, and as detailed on the Drawings.

3.2.2.9 Embedded items: Install in accordance with ACI 301, Sections 5.4 and 6.5.

3.2.2.10 Expansion and control joints: Install in accordance with the Drawings.

3.2.2.11 Placing concrete against earth: Place on or against firm, damp surfaces free of frost, ice and free water. Do not place until required compaction has been obtained. Dampen earth surfaces to receive fresh concrete.

3.2.2.12 Consolidation: Consolidate concrete slabs in accordance with ACI 301, Section 11.6.

### 3.2.3 Concrete Repair and Form Removal

3.2.3.1 Form removal: Remove in accordance with ACI 301, Section 4.5.

3.2.3.2 Cut back form ties and examine concrete surfaces for defects. Repair only after permission for patching is given by KEH (Acceptance Inspector).

3.2.3.3 Place concrete repair mortar within 1 hour after mixing. Do not retemper mortar.

3.2.3.4 Surface defect repair: Repair in accordance with ACI 301, Sections 9.1, 9.2 and 9.3. Cure concrete repairs same as new concrete.

### 3.2.4 Concrete Finishes and Tolerances

3.2.4.1 Formed surfaces: Start finishing following concrete repair and complete within 96 hours after forms have been removed. Finish in accordance with sections of ACI 301 noted below.

- |   |                |
|---|----------------|
| a. Surfaces exposed to earth backfill             | Section 10.2.1 |
| b. Interior surfaces                              | Section 10.2.2 |
| c. Exterior surfaces exposed to weather           | Section 10.2.2 |
| d. Related unformed surfaces                      | Section 10.5   |
| e. Surfaces to receive special protective coating | Section 10.3.2 |

3.2.4.2 Unformed surfaces: Finish in accordance with sections of ACI 301 noted below:

- |   |                |
|---|----------------|
| a. Interior floors                        | Section 11.7.3 |
| b. Exterior slabs subject to foot traffic | Section 11.7.4 |

### 3.3 FIELD QUALITY CONTROL

3.3.1 Concrete Testing: Sampling and testing of concrete will be the responsibility of KEH (Acceptance Inspector). Concrete will be tested to ACI 301, Sections 16.3.4, 16.3.5, 16.3.6 and 16.3.8.

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### 3.4 CURING AND PROTECTION

#### 3.4.1 Curing

3.4.1.1 Cure concrete in accordance with ACI 301, Section 12.2. Clear curing compounds shall be tinted or applied surfaces marked to delineate extent of spraying.

3.4.1.2 Do not use curing compound on concrete surfaces to receive flooring or special protective coating.

#### 3.4.2 Protection

3.4.2.1 Protect concrete during extreme weather conditions in accordance with ACI 301, Section 12.3.

3.4.2.2 Protect concrete from mechanical injury in accordance with ACI 301, Section 12.4.

END OF SECTION

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## SECTION 07200

### INSULATION

#### PART 1 - GENERAL

##### 1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

##### 1.1.1.1 American Society for Testing and Materials (ASTM)

C 578-87a

Standard Specification for  
Preformed, Cellular Polystyrene  
Thermal Insulation

1.2 SUBMITTALS: Refer to Section 01300 for submittal procedures.

##### 1.3 DELIVERY, STORAGE, AND HANDLING

1.3.1 Deliver materials to site in original sealed containers or packages bearing manufacturer's name and brand designation. Where materials are covered by referenced specification, containers or packages shall bear specification number, type, and class as applicable.

1.3.2 Store and handle materials in manner to protect from damage during entire construction period.

1.3.3 Store insulation off ground and under cover to protect against weather, moisture, and physical damage.

#### PART 2 - PRODUCTS

##### 2.1 MATERIALS

2.1.1 Perimeter Insulation: Polystyrene foam board, 2 inch thick, meeting the requirements of ASTM C 578, Type IV. Styrofoam SM manufactured by Dow Chemical USA.

2.1.2 Adhesive: Styrofoam #7 or Styrofoam #1.

#### PART 3 - EXECUTION

##### 3.1 INSTALLATION

##### 3.1.1 Perimeter Insulation

3.1.1.1 Install against exterior faces of foundation walls, continuous around entire perimeter of building.

3.1.1.2 If application is with adhesive, verify that fins and projections left after removal of forms have been removed from concrete surfaces. Clean dirt, wax, or oily film from concrete.

3.1.1.3 Install either by placing in forms before concrete placement, or by applying to completed foundation wall with adhesive recommended by insulation manufacturer.

END OF SECTION

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SECTION 07920

SEALANTS AND CAULKING

PART 1 - GENERAL

1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

1.1.1.1 American Society for Testing and Materials (ASTM)

D 994-71(1982)

Standard Specification for  
Preformed Expansion Joint Filler  
for Concrete (Bituminous Type)

1.2 SUBMITTALS: Refer to Section 01300 for submittal procedures.

1.2.1 Manufacturer's Installation Instructions: Submit manufacturer's instructions for cleaning, priming, and application of sealants and caulking for each material and condition of application.

1.3 DELIVERY, STORAGE, AND HANDLING

1.3.1 Deliver materials to site in manufacturer's original containers unopened, and labels intact.

1.3.2 Store and handle materials to prevent inclusion of foreign materials or exposure to temperatures exceeding 90 F.

1.3.3 Discard sealants or components outdated as indicated by shelf life date.

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 General: Container labels shall show name of material, date of manufacture, mixing instructions, shelf life, and curing time.

2.1.2 Sealant: TU400 polyurethane sealant or United Coatings, Uniflex Sealant 200.

2.1.3 Primer: Nonstaining type, recommended by manufacturer of sealant or caulking compound for intended service.

2.1.4 Backer Rod: Closed-cell polyethylene foam rod, approximately 25 percent larger than width of joint in which to be installed.

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2.1.5 Expansion Joint Filler: Bituminous type meeting the requirements of ASTM D 994.

2.1.6 Bond Breaker Tape: Polyethylene tape with pressure-sensitive adhesive.

### PART 3 - EXECUTION

#### 3.1 PREPARATION

3.1.1 Clean joints to be sealed or caulked of dirt, dust, oil, grease, mortar, or other foreign materials.

3.1.2 Follow recommendations of manufacturer of sealing or caulking materials for each condition of application.

3.1.3 Remove loose particles with wire brush. Blow out joints with oil and moisture free compressed air. Remove wax or oil with methyl ethyl ketone or Xylol.

#### 3.2 INSTALLATION

##### 3.2.1 Primer

3.2.1.1 Prime joints when and as recommended by sealant or caulking manufacturer for each condition of application.

3.2.1.2 Do not apply primer to concrete until concrete has cured at least 28 days.

##### 3.2.2 Back-Up

3.2.2.1 Install backer rod in joints where sealant is to be applied. Install with proper tool, in accordance with manufacturer's instructions and to correct depth for sealant shape specified. Where depth of joint is not sufficient for installation of backer rod, use bond-breaker tape to prevent 3 point adhesion.

3.2.2.2 Install bond-breaker tape over expansion joint filler, in joints where sealant is to be applied.

3.2.3 Joint Dimensions: Except as shown otherwise on the Drawings, make depth of sealant joints 1/2 of joint width.

##### 3.2.4 Sealant

3.2.4.1 Perform sealing work using specified materials and proper tools in accordance with manufacturer's recommendations for conditions of each application.

3.2.4.2 Use sealant in joints of concrete floors as shown on drawings.

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3.2.4.3 Apply sealant to clean and dry joints only.

3.2.4.4 Do not apply exterior sealing material when ambient temperature is below 40 F or above 100 F.

3.2.4.5 Apply sealing materials with guns having proper size nozzles and using sufficient pressure to fill spaces and voids solid. Where use of gun is impractical, proper hand tools, as approved, may be used.

3.2.4.6 Tool sealant after installation as required to properly fill joint and produce smooth surface.

3.2.4.7 Take necessary precautions to prevent contact of sealants with adjacent surfaces. If necessary, apply masking tape in continuous strips in alignment with edge of joint. Remove masking tape after joints have been tooled.

END OF SECTION

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APPENDIX 4A-3

CONSTRUCTION SPECIFICATION W-016H-C1, AS-BUILT REV. 1,  
FOR RADIOACTIVE MIXED WASTE STORAGE FACILITIES

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V-W016HC1-001

W-016H-C1  
AS-BUILT REV. 1

CONSTRUCTION SPECIFICATION  
FOR  
RADIOACTIVE MIXED WASTE STORAGE FACILITIES

Original Revision: 12-19-89

CR9106

Prepared By:

KAISER ENGINEERS HANFORD COMPANY  
Richland, Washington

For the US Department of Energy

Contract DE-AC06-87RL10900

OFFICIAL RELEASE  
BY WHC  
DATE JUN - 5 1991

Sta. #10

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<u>A. Z. Wells</u>	<u>5-30-91</u>
Client Concurrence	Date
<u>W. A. Holst</u> <u>5/30/91</u> / <u>PE M. A. Baker</u> <u>5-29-91</u>	
Project Manager	Date
<u>[Signature]</u>	<u>5/30/91</u>
Field Concurrence	Date
<u>M. A. Kubendic</u>	<u>4-16-91</u>
Checked By	Date
<u>Everett E. Wahl</u>	<u>4-16-91</u>
Prepared By	Date

ECNs affecting specification.

ECN W-016-2  
01010-1, 1a  
01300-4, 5

ECN W-016-3  
03300-2, 3, 3a,  
4, 4a, 5

ECN W-016-4  
01010-1, 1a

ECN W-016-5  
01310-4, 4a, 4b

ECN W-016-6  
09805-2  
13120-5

ECN W-016-7  
02200-2

ECN W-016-9  
16300-2, 3, 5,  
7, 7a  
16400-1, 3, 10, 11

ECN W-016-10  
03300-1, 2, 2a

ECN W-016-11  
16400-1, 8, 8a, 6

ECN W-016-22  
03300-2

ECN W-016-33  
03300-2

ECN W-016-40  
08710-3

ECN W-016-49  
07920-2

ECN W-016-15  
16400-9

ECN W-016-23  
03300-2

ECN W-016-35  
03300-5  
09805-2, 3, 4

ECN W-016-41  
16400-4

ECN W-016-16  
08710-2, 3

ECN W-016-25  
02650-2, 3

ECN W-016-38  
01010-1, 1a

ECN W-016-44  
09805-4

ECN W-016-17  
02650-7

ECN W-016-28  
02650-5

ECN W-016-39  
02200-2

ECN W-016-47  
15500-2

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## TABLE OF CONTENTS

### Total Pages

#### DIVISION 1 - GENERAL REQUIREMENTS

Section 01010	Summary of Work	2
Section 01019	Items Furnished for Construction	3
Section 01027	Application for Payment	4
Section 01040	Coordination	2
Section 01043	Job Site Administration	3
Section 01050	Survey and Field Engineering	2
Section 01065	Permits	2
Section 01100	Special Project Procedures	3
Section 01200	Project Meetings	2
Section 01300	Submittals	8
Section 01310	Progress Schedules	5
Section 01400	Quality Assurance	5
Section 01500	Construction Facilities and Temporary Controls	5
Section 01610	Transportation and Handling	1
Section 01630	Product Option and Substitution	4
Section 01720	Project Record Documents	3

#### DIVISION 2 - SITEWORK

Section 02200	Earthwork	7
Section 02235	Road Subgrade and Granular Base	5
Section 02512	Hot-Laid Asphaltic Concrete Pavement	3
Section 02650	Piped Utilities	8
Section 02668	Fire Water Systems	8

#### DIVISION 3 - CONCRETE

Section 03300	Cast-In-Place Concrete	6
---------------	------------------------	---

#### DIVISION 5 - METALS

Section 05400	Cold-Formed Metal Framing	2
Section 05500	Metal Fabrications	4

#### DIVISION 7 - THERMAL AND MOISTURE PROTECTION

Section 07200	Insulation	2
Section 07400	Preformed Roofing and Cladding/Siding	4
Section 07600	Flashing and Sheet Metal	2
Section 07920	Sealants and Calking	4

#### DIVISION 8 - DOORS AND WINDOWS

Section 08100	Metal Doors and Frames	3
Section 08332	Overhead Coiling Doors	2
Section 08710	Finish Hardware	3
Section 08800	Glazing	3

#### DIVISION 9 - FINISHES

Section 09805	Special Protective Coating	4
Section 09900	Painting	8

#### DIVISION 13 - SPECIAL CONSTRUCTION

Section 13120	Pre-engineered Structures	8
---------------	---------------------------	---

Total Pages

DIVISION 15 - MECHANICAL

Section 15300	Fire Protection	8
Section 15500	Heating, Ventilating and Air Conditioning	5

DIVISION 16 - ELECTRICAL

Section 16300	High Voltage Distribution (Above 600-Volt)	10
Section 16400	Service and Distribution (600-Volt and Below)	14
Section 16720	Alarm and Detection Systems	12
Appendix A	Sample Battery Calculation	1

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SECTION 01010  
SUMMARY OF WORK

PART 1 - GENERAL

1.1 INTRODUCTION

1.1.1 Project W-016H Radioactive Mixed Waste Storage Facility is located in the 200W Limited Access Area of the Hanford Site, approximately 25 road miles northwest of Richland, Washington.

1.2 STATEMENT OF WORK *FOR CONTRACT KEH-5207 FIXED PRICE CONTRACTOR*

ECN-2

1.2.1 Scope: The work consists of furnishing supervision, labor, equipment, materials, transportation, and services for procurement, receiving, handling, storage, protection, fabrication, installation inspection, and testing to provide a ready for occupancy facility in accordance with these Contract Documents.

1.2.2 Work Included: The following itemization is intended to be broad in scope to identify major work elements and is not all inclusive.

1.2.2.1 Clear and grub for the building foundation and slab.

1.2.2.2 Clear grade, gravel, and asphalt roadway.

1.2.2.3 Construct underground site sanitary and fire water systems.

1.2.2.4 Furnish and install underground site electrical service.

1.2.2.5 Design, fabricate, and erect 34,000 square foot metal building including doors and architectural finishes.

1.2.2.6 Furnish and install building mechanical and electrical systems.

1.2.2.7 Design and install building fire protection system.

1.2.2.8 Furnish and apply epoxy coating to building slab.

1.2.2.9 Furnish and install radiation monitoring devices.

1.2.2.10 *Cut and dispose of approximately 1000cy of excess material not identified by the contour lines on Drawing H-2-99964 Sh 1 Rev 0.*

ECN-4  
ECN-4

1.2.3 *Work Not Included: The 12" diameter underground sanitary water line that runs down 23rd Street from W73870 through the PIV located at W78230 up to PIV located at W78230 (PIV is by contractor).*

ECN-2  
ECN-2  
ECN-38

1.3 ~~DRAWINGS: --The Drawings which show the work to be accomplished by these Contract Documents are listed on Drawing H-2-99963.~~

ECN-2  
ECN-2

1.3 STATEMENT OF WORK FOR ON-SITE KEH CONSTRUCTION FORCES

1.3.1 Scope: The work consists of furnishing supervision, labor, equipment, materials, transportation and services for procurement, receiving, handling, storage, protection, fabrication, installation, inspection and testing to provide an underground sanitary water line in accordance with applicable project documents.

1.3.2 Work Included: The 12" diameter underground sanitary water line that runs down 23rd Street from W73870 to W78230. The work includes the hot tie-in at W73870. (PIV at W78230 is by Contract KEH-5207).

1.4 DOCUMENTS APPLICABLE TO CONTRACT NO. 5207 FIXED PRICE CONTRACTOR

1.4.1 Specification: V-W016HC1-001 and all sections listed therein.

1.4.2 Drawings: The drawings which show the work to be accomplished are listed on Drawing H-2-99963 in the Schedule of Drawings.

1.5 DOCUMENTS APPLICABLE TO ONSITE KEH CONSTRUCTION FORCES.

1.5.1 Specification: V-W016HC1-001 with the following list of sections:

01010 Summary of Work  
01300 Submittals  
02200 Earthwork  
02235 Road Subgrade and Granular Base  
02650 Piped Utilities  
03300 Cast-in-Place Concrete

1.5.2 Drawings: H-2-9963 sht 1, and H-2-99965 shts 1, 2, 3.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

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## SECTION 01019

### ITEMS FURNISHED FOR CONSTRUCTION

#### PART 1 - GENERAL

##### 1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

##### 1.1.1.1 Code of Federal Regulations (CFR)

Title 30 Mineral Resources

Sub Chapter N - Metal and Nonmetal Mine Safety and Health

30 CFR 56

Safety and Health Standards -  
Surface Metal and Nonmetal Mines

##### 1.2 SUBMITTALS: Not Used

##### 1.3 GENERAL

1.3.1 Material and equipment furnished or made available to be incorporated into the Work are set forth in this Section. Other services and utilities provided are covered in other sections of this Specification.

1.3.2 Comply with provisions of Section 9 of the Contract General Conditions for all items furnished for construction.

1.3.3 Provide KEH access to the premises where items furnished for construction are stored before incorporation into the Work.

##### 1.4 GRAVEL AND SAND

1.4.1 Gravel and sand from unmined natural deposits are available at no cost from sites designated by KEH within 4 miles of the project site. KEH makes no representation that unmined materials will meet physical properties required in this Specification.

1.4.2 If the Contractor elects to utilize the available gravel sites, Contractor shall furnish all equipment and labor required to excavate, process, load, transport, and place the gravel and sand.

1.4.3 Material from the gravel sites shall be used only for the work covered by this Specification and no gravel or sand, processed or nonprocessed, or concrete manufactured therefrom shall be transported off the Hanford Site.

1.4.4 Access to gravel sites and travel between gravel sites and construction sites shall be on roads designated by KEH and the use shall be in compliance with the requirements of Section 01500 of this Specification.

1.4.5 Operations at the gravel sites shall be in compliance with the following requirements.

1.4.5.1 Confine removal of overburden and top soil to areas designated by KEH. Stabilize blow sand areas after surface has been disturbed with ballast or other approved method to prevent wind erosion.

1.4.5.2 Make no excavation or bank cut within 100 feet of power lines, paved roads, railroads, security fences, or other permanent structures.

1.4.5.3 Excavation and processing shall be in accordance with 30 CFR 56, Safety and Health Standards. Correct operations identified by KEH to be hazardous to life or property.

1.4.5.4 Explosives are prohibited articles as described in Section 56 of the Contract General Conditions and shall not be brought to the Hanford Site or proposed for use without written KEH approval.

1.4.5.5 Temporary structures are permitted at the gravel site for offices, storage, or repair facilities necessary for the gravel removal and processing operations. No facility for habitation shall be permitted.

1.4.5.6 Use of gravel sites shall be nonexclusive. Others may also enter the gravel sites to excavate material required for other work.

1.4.5.7 Upon completion of operations the gravel site shall be cleared of debris, temporary structures, and equipment. The excavated area shall be graded, banks properly sloped, and stabilized to prevent wind erosion. Conditions identified by KEH as not meeting these requirements shall be corrected before final acceptance of the Work.

1.4.5.8 The right to use the gravel sites may be terminated by KEH for failure to comply with requirements set forth herein or for abandonment of operations under this contract. The right to use the gravel sites shall terminate without notice upon acceptance of Work under this Contract.

## 1.5 MATERIALS AND EQUIPMENT

1.5.1 Other materials and equipment shown or specified in the Specifications and the Drawings required to complete the Work shall be furnished by the Contractor.

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PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

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# SECTION 01027

## APPLICATION FOR PAYMENT

### PART 1 - GENERAL

1.1 REFERENCES: Not Used

1.2 SUBMITTALS: Not Used

1.3 FORMAT

1.3.1 Complete Form KEH-1026.00, Progress Estimate Backup, sample appended. Contractor developed substitutes for form may be used only with prior approval of KEH.

1.3.2 Complete Form KEH-0959.00, Monthly Estimate of Work Completed, sample appended, or include following in letter requesting payments.

Subtotal Value of All Pay Items		\$X,XXX.XX
Completed to date (Include all modifications)		

Allowance for Material Stored on Site		
Previous Net Allowance	\$X,XXX.XX	
Minus Materials Placed	X,XXX.XX	
Plus Materials Stored	<u>X,XXX.XX</u>	
Net Allowance		<u>X,XXX.XX</u>

Subtotal Value Completed to Date		
Less Previous Payments	X,XXX.XX	
Less Other Charges from KEH	<u>X,XXX.XX</u>	
Subtotal Deductions		<u>(X,XXX.XX)</u>

Total Payment Requested		<u>\$X,XXX.XX</u>
Less Retainage @ _____%		<u>(X,XXX.XX)</u>

Total Payment Allowed		\$X,XXX.XX
-----------------------	--	------------

### 1.4 APPLICATION PROCEDURE

1.4.1 Payments to Contractor set forth in Section 15 of Contract General Conditions are initiated by Contractor making application for payment as follows.

1.4.1.1 Begin application for payment by completing KEH furnished Form referenced in Paragraph 1.3.1. Include, as minimum, breakdown of contract price for each item listed in Section 01310 and percent complete for each item.

1.4.1.2 Review backup sheets with KEH and adjust data.

1.4.1.3 Finalize application for payment by either completing Form KEH-0959.00 or initiating letter containing elements of Paragraph 1.3.2.

#### 1.5 PAYMENT PROCEDURE

1.5.1 Upon receipt of application for payment, KEH will audit data and check for compliance with requirements of Section 01720. When satisfied that contract requirements are up-to-date, Form KEH-0959.00 will be prepared and signed by KEH.

1.5.2 Copy of signed Form showing amount of payment to be made will be furnished Contractor.

1.5.3 KEH will mail check to Contractor's designated address.

#### 1.6 ADDITIONAL DATA REQUIRED

1.6.1 When processing applications for payment and preparing payment documents, KEH may require data to substantiate and justify amounts requested. Processing of payment documents may be delayed if data is not forwarded expeditiously to KEH.

1.6.2 Requests for payment for equipment or material which Contractor has received, but has not installed, shall be accompanied by invoice or other data to provide evidence that title to equipment or material is held by Contractor.

#### PART 2 - PRODUCTS

Not Used

#### PART 3 - EXECUTION

Not Used

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# PROGRESS ESTIMATE BACKUP

Contractor:

Contract No.:

Backup For Progress Estimate No.:

**Dated:**

[illegible]

**KAISER ENGINEERS  
HANFORD**

**MONTHLY ESTIMATE OF WORK COMPLETED**

Contract or P.O. No.	Estimate No.	Date
----------------------	--------------	------

Name of Contractor

Address

Nature of Work

Initial Amount of Contract \$	Total Amount of Modifications to Date \$	Total Adjusted Contract Amount \$
----------------------------------	---	--------------------------------------

Description	Amount
-------------	--------

Estimated Work Completed to (Date)

Less:	\$	
6 Previous Payments	\$	
8 Other Charges (Explain Below)	\$	

2 Total Deductions (\$

Adjusted Payment Requested \$

Less Retainage @ \_\_\_\_\_ % \$

3 Total Payment Allowed \$

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2

I certify that I have verified this periodical estimate dated \_\_\_\_\_ for \$ \_\_\_\_\_ and that to the best of my knowledge and belief it is a true and correct statement of work performed and that the contractor's statement of his account and amount due him is correct and just, and the quantities included in this estimate have been performed in full accordance with the terms and conditions of the corresponding construction documents.

FOR THE CONTRACTOR

KAISER ENGINEERS HANFORD COMPANY

## SECTION 01040

### COORDINATION

#### PART 1 - GENERAL

1.1 REFERENCES: Not Used

1.2 SUBMITTALS: Not Used

#### 1.3 CONSTRUCTION ACTIVITIES

1.3.1 Coordinate construction activities to assure efficient and orderly sequence of work, with provisions for accommodating items to be installed later.

1.3.2 As noted in Section 29 of the Contract General Conditions, other contracts may be under construction concurrently with the work included in this Specification. The Contractor shall coordinate his activities with those of other contractors for the mutual benefit of all. Coordination meetings may be required in addition to progress meetings to keep all parties informed of scheduled activities at interface points.

#### 1.4 WORK IN EXISTING FACILITIES

1.4.1 Buildings No. 2402 WA, WB, WC, WD, WE, WF, WG, WH, WI, WJ, WK, and WL are operating facilities and work must be planned and scheduled to minimize interference with plant operations and to sustain the safety of operating personnel.

1.4.2 Access to the work area shall be only as directed by KEH to minimize disruptions to work force.

1.4.3 Keep work area safe and orderly for construction personnel and operating personnel. Clean work area after each work period and stack tools and materials away from traffic areas.

#### 1.5 CONNECTIONS TO EXISTING SYSTEMS

1.5.1 Forty-eight hour notice of work that will affect existing systems shall be given to KEH. Careful planning and scheduling of work activities is required to coordinate operations of existing systems to keep disruptions at a minimum.

1.5.1.1 Installation of the 24 inch diameter pipe sleeve located at each railroad crossing (typical 4 places) shall be performed by mechanical boring. Removal of railroad track and ties shall not be permitted. Notify KEH two weeks before performing this work.

1.5.2 As required in Subsection 50.7 of Contract General Conditions, the connection to the existing systems must be scheduled 2 weeks in advance for work to be done. KEH will coordinate the schedule with the Contractor and utility.

1.5.3 The connection must be accomplished within 24 hours.

#### 1.6 ACCESS TO WORK AFTER POSSESSION

1.6.1 Access to warranty work as set forth in Section 24 of Contract General Conditions or access to work after possession as set forth in Section 20 of Contract General Conditions will be coordinated by KEH with other contractors, and users of the facility. Notify KEH in advance of proposed work to minimize disruptions.

#### PART 2 - PRODUCTS

Not Used

#### PART 3 - EXECUTION

Not Used

END OF SECTION



SECTION 01043

JOB SITE ADMINISTRATION

PART 1 - GENERAL

1.1 REFERENCES: Not Used

1.2 SUBMITTALS: Not Used

1.3 WORKING HOURS

1.3.1 Work shall be performed during regular day shift which is 7:30 a.m. to 4:00 p.m., Monday through Friday, excluding holidays.

1.3.2 Work other than regular day shift requires KEH approval in advance as set forth in Section 51 of Contract General Conditions.

1.4 BADGE, DOSIMETER, AND ORIENTATION

1.4.1 The Work is within a Limited Access Area. Badging, basic dosimeter requirements, and orientation will be in accordance with Section 56 of Contract General Conditions.

1.5 EVACUATION DRILLS

1.5.1 Personnel working inside Limited Access Area are required to participate in emergency evacuation drills which are held approximately once every 3 months and last approximately 1 hour.

1.5.2 Maintain daily log or other suitable record of names of all personnel including subcontractors working inside the Limited Access Area.

1.6 SECURITY

1.6.1 Policy and Procedures: Contractor employees are required to comply with security policy and procedures set forth in Sections 56 and 87 of Contract General Conditions. Copies of Safeguards and Security Manual KEH-MA-6 will be provided to the Contractor upon request after award of Contract.

1.6.2 Security Escorts

1.6.2.1 Contractor personnel not having "5" or "3" security clearance, working within 200 West Limited Area require security escorts. Escorts are provided by KEH at no cost except as set forth in subparagraph 1.6.2.8.

1.6.2.2 Escorts will be assigned from the KEH trailer located outside the 200 East Limited Area near Access Gate 814.

1.6.2.3 The ratio of escorts to uncleared Contractor personnel for the purpose of daily transportation of men and materials to the worksite shall

be 1 to 5, irrespective of the type of craft or lower tier companies the 5 personnel represent. For days when the Contractor's total work force is less than 5 people, a maximum of 1 escort will be provided.

1.6.2.4 The ratio of escorts to uncleared personnel at the worksite through the course of a workday shall be the same as set forth in subparagraph 1.6.2.3.

1.6.2.5 Contractor shall provide "pooled" transportation for his uncleared personnel and the KEH escorts into the limited/protected work areas. A maximum of 3 Contractor vehicles for uncleared personnel will be allowed into the limited/protected area at any time. No personal vehicles will be allowed into the limited area under this contract.

1.6.2.6 Parking for personnel and Contractor vehicles not used due to "pooling" of personnel to the worksite shall be available at the escort trailer near 200 East Area Gate 814.

1.6.2.7 Provide a list of Contractor personnel and vehicles to be used inside the limited/protected area and anticipated start and duration of the utilization. Provide the list 1 week before the start of work for escort requirement determination. Provide weekly work schedules of employees, not later than Thursday of the preceding week (minimum 24 hour notice required for changes).

1.6.2.8 The Contractor may be charged when escorts have been requested and the Contractor personnel do not show up at the time and place specified. Charges will be made at the rate of \$18 per hour for each escort for time lost waiting for Contractor personnel.

### 1.6.3 Security Clearances

1.6.3.1 Security clearances for Contractor employees may be provided for this Work and reduce the requirements for security escorts during construction. Requests for "5" clearance will be considered under the following circumstances.

1.6.3.2 Contractor has a contract with KEH for work within a Limited Area and has a minimum of 60 calendar days of onsite work remaining when request for clearance is received.

1.6.3.3 Clearances requested are for full-time employees, including crafts, expected to be employed for duration of Contract.

1.6.3.4 A personnel security questionnaire (PSQ) shall be completed for each person requesting clearance immediately after Contract award or as soon as onsite personnel requirements are known. Personnel security questionnaire forms available upon request.

1.6.3.5 Employees that received security clearances are required to sign a Security Termination Form, furnished by KEH, and return the form with the security badge when their Work is completed or the Contract terminated.

1.7 WORK NEAR ELECTRICAL LINES

1.7.1 In addition to requirements of Subsection 50.2 of Contract General Conditions, when cranes or hoists are operated under or adjacent to existing overhead electrical lines, a standby lineman must be in attendance. Notify KEH not less than 3 working days before standby lineman is required. The standby lineman will be furnished by KEH at no cost.

1.8 SAFETY REQUIREMENTS

1.8.1 Fire Safety

1.8.1.1 The Contractor is required to address fire safety as part of his construction safety plan as required by Section 55 of Contract General Conditions. The following fire safety requirements are to be incorporated into the construction safety plan.

a. Portable shields shall be utilized wherever the Contractor is welding, cutting, or grinding.

b. Maintain a fire watch a minimum of 1/2 hour after the cessation of welding, cutting, or grinding.

c. Fully charged fire extinguishers shall be available whenever welding, cutting, or grinding.

d. Method to control the ignition of brush fires.

e. Method to comply with requirements for off road driving and grass fire prevention given in Section 01500.

1.8.2 Safety Apparel

1.8.2.1 Personnel shall wear appropriate foot wear in a recognized construction area. Tennis shoes, canvas type shoes, or open toe shoes do not meet this requirement.

1.8.2.2 Personnel, including nonconstruction, shall wear approved eye protection and construction type hardhats when in construction area.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

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## SECTION 01050

### SURVEY AND FIELD ENGINEERING

#### PART 1 - GENERAL

1.1 REFERENCES: Not Used

1.2 SUBMITTALS: Not Used

1.3 QUALITY CONTROL

1.3.1 Establishing alignment, support location, and grades shall be the responsibility of a Land Surveyor registered in the State of Washington and acceptable to KEH.

1.3.2 Field notes, records, and documentation shall be available to KEH to review and verify the procedures used and the accuracy of work.

1.4 SURVEY DATA

1.4.1 Basic reference points with coordinate descriptions and bench mark with elevation identified will be located in the field by KEH Representative. Detail surveys shall be by Contractor.

1.4.2 Contractor shall be responsible for the preservation of bench marks and reference points, including stakes or other markers established until removal is authorized by KEH.

1.4.3 From information and dimensions indicated on the construction Drawings, Contractor shall perform survey/layout as required by the Work.

1.5 PROCEDURES

1.5.1 Before initial layout field verify horizontal and vertical data. Report discrepancies to KEH before proceeding.

1.5.2 Establish an adequate number of permanent reference points to be used during construction referenced to original control points. Record locations with horizontal and vertical data on Project Record Documents.

1.5.3 Protect and preserve control points and reference points until work is complete. Report to KEH the loss or destruction of any control point. Report the relocation or change in data affecting the reference points.

1.5.4 Periodically, verify data for each control point, reference point, and construction staking to maintain construction accuracy.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

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## SECTION 01065

### PERMITS

#### PART 1 - GENERAL

1.1 REFERENCES: Not Used

1.2 SUBMITTALS: Not Used

#### 1.3 FEDERAL, STATE, AND MUNICIPAL LAWS, CODES, AND REGULATIONS

1.3.1 Permits or licenses to do business as required by Federal, State, and Municipal laws, codes, and regulations are the sole responsibility of the Contractor as stated in Section 6 of Contract General Conditions.

#### 1.4 HANFORD SITE PERMITS

1.4.1 General: Before certain types of work can be done at Hanford, the Contractor is required to have a permit. These permits are provided by KEH at no cost to the Contractor; however, the Contractor must furnish information required and must notify KEH in advance of work for which permit is required. The Contractor shall comply with requirements and restrictions set forth in each permit.

1.4.2 Excavation: As set forth in Subsection 50.9 of Contract General Conditions no excavation shall be done without an Excavation Permit. Permit will be issued before start of construction and is for duration of the Work. Post permit at site of Work. In addition to the requirements on the KEH excavation permit, the contractor is required to have GTE locate any buried telephone lines prior to excavation. Telephone 1-800-424-5555.

1.4.3 Backfill Permit: Permit required for each element of fill and backfill and good for 5 days or duration of work element provided Work does not stop for 5 consecutive days. Permit form furnished by KEH shall be completed by Contractor and returned to KEH for approval before starting work. Permit shall be kept at worksite.

1.4.4 Tie-in Permit: A separate permit is required for each utility tie-in and is valid until tie-in is completed. Permits furnished by KEH with 5 days notice. Permit shall be kept at site of Work being performed.

1.4.5 Welding and Cutting Permit: All welding and flame cutting requires welding and cutting permit. Provide welding process to be used 5 days before start of welding for KEH to furnish permit. Permit shall be kept at worksite.

1.4.6 Oversize Load Permit: In addition to Washington State Permit, a site permit is required for each movement of oversize load or vehicle on established roads at Hanford Site. Permit will be furnished by KEH with 48 hour notice of the width, height and length of the oversized load and the proposed route of travel. The Contractor will be requested to verify the

proposed route has been travelled and all limitations (especially, wire or signal height) have been identified. See Section 01500 for vehicles requiring Oversize Load Permit, restrictions on movement, and other requirements.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

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SECTION 01100

SPECIAL PROJECT PROCEDURES

PART 1 - GENERAL

1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications including documents referenced therein, form part of this Section to extent designated herein.

1.1.1.1 American Conference of Governmental Industrial Hygienists (ACGIH)  
Latest Edition Threshold Limit Values

1.1.1.2 Federal Standards (FED STD)  
FED-STD-313C Material Safety Data,  
Transportation Data, And Disposal  
Data For Hazardous Materials  
Furnished To Government  
Activities

1.1.1.3 Occupational Safety and Health Administration (OSHA)  
Code of Federal Regulations (CFR)  
Title 29, Labor  
Chapter XVII, Occupational Safety and Health Administration,  
Department of Labor  
Part 1910, Occupational Safety and Health Standards  
Subpart Z Toxic and Hazardous Substances

1.1.1.4 Washington Industrial Safety and Health Act (WISHA)  
Washington Administrative Code (WAC)

Chapter 173-303 WAC, Dangerous  
Waste Regulations

173-303-330 Personnel Training

Chapter 296-62 WAC, Occupational  
Health Standards - Safety  
Standards for Carcinogens

296-62-07111 Respirable Air and Oxygen for  
Self-Contained Breathing  
Apparatus and Supplied Air  
Respirators

1.2 SUBMITTALS: Refer to Section 01300 for submittal procedures.

1.2.1 Hazardous Materials

1.2.1.1 Provide a listing of all hazardous materials prior to using the material at the job site.

1.2.1.2 Provide a material safety data sheet (MSDS) for each material listed.

1.2.1.3 Provide method for storage of materials.

1.2.1.4 Provide method for interim storage of waste.

1.3 HAZARDOUS MATERIAL REQUIREMENTS

1.3.1 Definitions

1.3.1.1 Hazardous material: A material or substance which is determined to be physically or chemically deleterious to the health or well being of an individual because of its toxic, reactive, flammable, or carcinogenic nature. For the most part, a list of these materials may be found in 29 CFR 1910, Subpart Z, and the latest edition of the ACGIH Threshold Limit Values booklet.

1.3.1.2 Hazardous material storage area: A place of accumulation of hazardous materials, in quantities greater than a 1 day supply.

1.3.2 Hazardous materials, whether specified, recommended, or voluntarily requisitioned by the Contractor, shall be governed by the requirements of FED-STD-313 and Section 111 of Contract General Conditions.

1.3.3 Hazardous Waste Handling

1.3.3.1 All hazardous waste materials generated by the Contractor at the job site shall be turned over to KEH for disposal.

1.3.3.2 Contractor personnel who handle, transfer, store or otherwise work with dangerous waste must be trained as required in WAC 173-303-330.

1.3.3.3 Hazardous waste spills must be reported to KEH immediately.

1.3.3.4 After identification of hazardous waste to be generated, a satellite accumulation area will be designated for the Contractor to deposit the waste.

1.3.3.5 Hazardous waste materials must be identified and packaged as approved or directed by KEH.

1.4 Breathing Air Requirements

1.4.1 Breathing air shall be of compressed G-7.1 Type 1 Grade E quality.

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1.4.2 Supply systems, including compressors, shall be in accordance with WAC 296-62-07111.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

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SECTION 01200  
PROJECT MEETINGS

PART 1 - GENERAL

1.1 REFERENCES: Not Used

1.2 SUBMITTALS: Not Used

1.3 MEETING PROCEDURES

1.3.1 Representatives from KEH and the Contractor, including major subcontractors, shall participate in all project meetings. Representatives from Operating Contractor and DOE may attend as required by items to be discussed.

1.3.2 Meeting times and locations shall be mutually agreed to by Contractor and KEH and will be held at the Hanford Site in Richland, Washington, except informal design reviews. KEH will issue notices of meetings and prepare meeting minutes which will be distributed to project participants.

1.4 SITE LABOR CONFERENCE

1.4.1 Before starting construction onsite, Contractor and subcontractors shall attend an informational conference on Hanford Site labor requirements applicable to this project. Contractor shall schedule the conference with KEH and identify all crafts for this project. KEH will provide meeting notice to representatives from labor organizations whose members may be utilized in construction and will attend the conference. Contractor shall conduct the meeting and present the proposed work plan and craft utilization. Contract General Conditions relating to labor will be reviewed.

1.5 PRECONSTRUCTION MEETING

1.5.1 Meeting will be scheduled by KEH before start of onsite work. Authorized representatives of Contractor and major subcontractors shall attend and KEH will advise others having an interest in the Work. Meeting will be chaired by KEH.

1.5.2 Following items, as a minimum, will be incorporated into agenda for meeting.

1.5.2.1 Point of contact and key personnel representing Operating Contractor, Safety, QA/QC, Acceptance Inspectors, and Contract Administrators.

1.5.2.2 Schedule requirements and restraints, submittals and work limitations.

1.5.2.3 Safety, construction progress meetings and frequency, and certified payrolls.

1.5.2.4 Report requirements and frequency.

1.5.2.5 Quality requirements.

1.5.2.6 Major material and equipment lists.

1.5.2.7 Other pertinent items.

## 1.6 CONSTRUCTION PROGRESS MEETINGS

1.6.1 Meetings are held weekly at time and location determined at preconstruction meeting and will be approximately 1 hour long.

1.6.2 KEH will chair the meeting and request attendance of key personnel as required. Authorized representative of Contractor and pertinent subcontractors shall attend.

1.6.3 Purpose of meetings is to monitor status and provide forum for exchange of pertinent information related to the Work. Major topics may include, but not be limited to, the following.

1.6.3.1 Schedule, cost, and construction status.

1.6.3.2 Design and scope changes.

1.6.3.3 Submittal status, key material and equipment delivery status.

1.6.3.4 Potential problem areas.

1.6.3.5 Inspection and testing status.

1.6.3.6 Action item status, goals for next meeting.

1.6.3.7 Other appropriate items.

1.6.4 Meeting minutes will be issued by KEH as promptly as possible following the meeting. Action items will be identified with assigned follow-up. Issues resolved will be reported in the minutes, as well as closed action items.

## PART 2 - PRODUCTS

Not Used

## PART 3 - EXECUTION

Not Used

END OF SECTION

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SECTION 01300

SUBMITTALS

PART 1 - GENERAL

1.1 DESCRIPTION

1.1.1 This Section summarizes submittals required in Part 1 of each section of this Specification. It explains type of submittals required, and describes procedures for submittals and review.

1.1.2 Submittals required in Part 1 of each section are summarized in Article 1.3. Each submittal is identified by Submittal Number, Reference Section, and Title. Submittals are required for either "Review and Approval" or "Review for Record".

1.1.2.1 Submittals requiring review and approval are to receive approval before procurement, fabrication, or construction is started.

1.1.2.2 Submittals requiring review for record are those on which procurement, fabrication, construction or acceptance testing may proceed, but acceptance is contingent upon compliance with Drawings and Specifications.

1.1.3 Supplemental Submittals are initiated by Contractor in accordance with Section 01630 for consideration of substitute products or corrective procedures and require review and approval.

1.2 SUBMITTAL PROCEDURES

1.2.1 Transmit submittals to KEH by Data Transmittal form.

1.2.2 Identify each submittal by Submittal Number, Reference Section, and Title noted in Article 1.3. Number of copies required for retention by KEH are shown in Schedule and include 2 copies to be returned to Contractor. Additional copies required for Contractor uses shall be added.

1.2.3 Review each submittal for completeness, compliance with Contract Documents, and for proper identification before sending to KEH. Submittal data shall either be stamped showing review process has taken place or Data Transmittal form may be signed with statement of "Reviewed for Compliance." Submittals not stamped or signed to show review will be returned without consideration.

1.2.4 Submittals requiring review and approval will be stamped by KEH and marked "Approved", "Approved with Exception" or "Not Approved, Revise and Resubmit." Approval of submittals does not relieve Contractor of responsibility for errors contained therein.

1.2.4.1 Approved submittals are identified by submittal stamp with "Approved" or "Approved with Exception" box checked. "Approved" signifies general concurrence to achieve conformance with design concept of Project

and compliance with requirements of Contract Documents. "Approved with Exception" signifies general concurrence with noteworthy comments or clarifications. Approval of specific item shall not be construed as approval of system or assembly of which item is a component.

1.2.4.2 A submittal which is not approved is identified as "Not Approved, Revise and Resubmit." Submittal is considered by KEH to be technically deficient or incomplete and therefore, unacceptable. Resubmittal is required, hence fabrication, procurement, or performance of procedures shall not proceed.

1.2.4.3 Upon receipt of deficient submittal data, make corrections noted on transmittal and resubmit data to KEH within 10 calendar days.

1.2.5 Materials and equipment fabricated or installed without required approved submittals, or which differ from approved Drawings or vendor data are subject to rejection and replacement at Contractor's expense.

1.2.6 Delays arising from failure to submit, in timely manner, required Drawings, and other related data described in Contract Documents, shall not constitute excusable delays for extensions, unless excusable under other provisions of Contract. Allow 15 calendar days for KEH review and disposition of submittals, including shop drawings and vendor information, required to be furnished. Time period will be measured from date of receipt of submittal in KEH's office to date of return mailing.

1.2.7 Contractor is responsible for dimensions to be confirmed and correlated at Project site.

1.2.8 Submittals for review and record will be reviewed and filed. Incomplete or inaccurate data will be returned marked "Resubmit" with appropriate comments, and items procured or work performed shall be corrected. Payment for equipment will not be made unless required Vendor Information has been furnished.

1.2.9 Supplemental submittals shall contain sufficient data required in Section 01630 to show substantial compliance with Drawings and Specifications. Substitute product submittals shall contain as minimum, outline dimensions, operating clearances, and engineering data. Identify each submittal by Specification Section number and Paragraph number or referenced Drawing number and detail. Improperly identified or incomplete submittals will be returned without consideration.

1.2.10 Procedures for performing certain items of work are required to be submitted for review and approval before work is commenced. Those work procedures which have been approved by KEH for work similar to that to be accomplished on Project may not need to be reapproved. Forward 1 copy of previously approved procedure to KEH by Data Transmittal form and identify by Submittal Number, Reference Section, Title, and either procedure number or project number for which procedure was approved. Submittal will be reviewed by KEH and if acceptable retained for record. If previously approved



procedure is not acceptable submittal will be returned with requirements for resubmittal.

### 1.3 SCHEDULE OF SUBMITTALS

Submittal Number	Submittal Title	Quantity	Review and Approval	Review For Record
CONTRACT GENERAL CONDITIONS				
55.2	Safety Program and Job Safety Analysis	5	5 days before start of work	
55.3	Industrial Injury/Illness Experience	5		5 days before start of work and each month
55.5.1	OSHA Form No. 200 Report	5		5th working day, each month
55.6	Equipment Certification	5		2 days before bringing equipment onsite
SPECIAL PROJECT PROCEDURES				
01100/1.2.1.1	Hazardous Materials List	5		Prior to delivery
01100/1.2.1.2	MSDS	5		Prior to delivery
01100/1.2.1.3	Method of Storage	5		Prior to delivery
01100/1.2.1.4	Method of Waste Storage	5		Prior to delivery
PROGRESS SCHEDULES				
01310/1.3.1.1	Progress Schedule for First 60 Days	5	10 days after notice of award	
01310/1.3.1.1	Progress Schedule for Duration of Contract	5	30 days after notice of award	

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Submittal Number	Submittal Title	Quantity	Review and Approval	Review For Record
PROGRESS SCHEDULES (Continued)				
01310/1.4	CPM Project Schedule	5	30 days after notice of award	
01310/1.5.1	Initial Bi-Weekly Work Schedule	2	10 days after notice of award	
01310/1.5.1	Subsequent Bi-Weekly Work Schedules	2	By noon each Friday	
EARTHWORK				
*02200/1.2.1	Method to Prevent Damage During Excavation	5	Before excavation	ECN-2
HOT-LAID ASPHALTIC CONCRETE PAVING				
02512/1.2.1	Laboratory Reports	5	Before delivery	
PIPED UTILITIES				
02650/1.2.1	Approval Data	5	Before delivery	
*02650/1.2.2	Leak/Pressure Test Procedures	5	Before testing	ECN-2
*02650/1.2.3	NFPA Test Certificate	5	Within 10 days after completion	ECN-2
FIRE WATER SYSTEMS				
02668/1.2.1	Approval Data	5	Before delivery	
02668/1.2.2	Vendor Information	12		Before installation
02668/1.2.3	Design/Installation Drawings	5	Before installation	

NOTE: \* Indicates submittal is not required by KEH Construction Forces.

ECN-2

Submittal Number	Submittal Title	Quantity	Review and Approval	Review For Record
FIRE WATER SYSTEMS (Continued)				
02668/1.2.4	Record Drawings	5	Within 10 days after completion	
02668/1.2.5	NFPA Test Certificate	5	Within 10 days after completion	
CAST-IN-PLACE CONCRETE				
*03300/1.2.1	Certification of Ready Mixed Concrete Production Facilities	5	Before mixing	ECN-2
*03300/1.2.2	Reinforcing Steel Fabricator Drawings	5	Before delivery	ECN-2
*03300/1.2.3	Block Diagram	5	Before installation of forms	ECN-2
*03300/1.2.4	Concrete Materials, Mix Design and Mix Proportions	5	Before mixing	ECN-2
*03300/1.2.5	Cold Weather Concreting	5	Before placing concrete	ECN-2
*03300/1.2.6	Curing Procedure	5	Before mixing	ECN-2
METAL FABRICATIONS				
05500/1.2.1	Fabricator Drawings for Gratings	5	Before fabrication	
PREFORMED ROOFING AND CLADDING/SIDING				
07400/1.2.1	Fabricator Drawings	5	Before fabrication	
07400/1.2.2	Color Samples	3	Before fabrication	

NOTE: \* Indicates submittal is not required by KEH Construction Forces.

ECN-2

Submittal Number	Submittal Title	Quantity	Review and Approval	Review For Record
FLASHING AND SHEET METAL				
07600/1.2.1	Fabricator Drawings	5	Before fabrication	
SEALANTS AND CALKING				
07920/1.2.1	Manufacturer's Installation Instructions	5	Before application	
METAL DOORS AND FRAMES				
08100/1.2.1	Fabricator Drawings	5	Before delivery	
OVERHEAD COILING DOORS				
08332/1.2.1	Fabricator Drawings	5	Before delivery	
FINISH HARDWARE				
08710/1.2.1	Hardware List	5	Concurrent with doors and frames	
SPECIAL PROTECTIVE COATING				
09805/1.2.1	List of Materials	5	Before delivery	
09805/1.2.2	Certificate of Compatibility	5	Before delivery	
PAINTING				
09900/1.2.1	List of Materials	5	Before delivery	
09900/1.2.2	Color Samples	3	Before delivery	
PRE-ENGINEERED STRUCTURES				
13120/1.2.1	Erection Instruc- tions and Diagrams	5	Before delivery	
13120/1.2.2	Certificates of Conformance or Compliance	5	Before delivery	
13120/1.2.3	Color Samples	1	Before delivery	

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Submittal Number	Submittal Title	Quantity	Review and Approval	Review For Record
<b>FIRE PROTECTION</b>				
15300/1.2.1	Approval Data	5	Before delivery	
15300/1.2.2	Vendor Information	12		Before installation
15300/1.2.3	Design/Fabricator Drawings	5	Before fabrication	
15300/1.2.4	Record Drawings	5		Within 10 days after completion
15300/1.2.5	NFPA Test Certificate	5		Within 10 days after completion
<b>HEATING, VENTILATING, AND AIR CONDITIONING</b>				
15500/1.2.1	Approval Data	5	Before delivery	
15500/1.2.2	Vendor Information	12		Before installation
15500/1.2.3	Test Data	5		Within 10 days after test completion
<b>HIGH VOLTAGE DISTRIBUTION (Above 600-Volt)</b>				
16300/1.2.1	Approval Data	5	Before delivery	
16300/1.2.2	Vendor Information	12		Before installation
<b>SERVICE AND DISTRIBUTION (600-Volt and Below)</b>				
16400/1.2.1	Approval Data	5	Before delivery	

Submittal Number	Submittal Title	Quantity	Review and Approval	Review For Record
ALARM AND DETECTION SYSTEMS				
16720/1.2.1	Approval Data	5	Before delivery	
16720/1.2.2	Vendor Information	12		Before installation

1.4 PREAPPROVED MATERIALS AND SUPPLIERS (no submittal required for these items)

1.4.1 Cast In-Place Concrete (Section 03300)

Supplier	Material
Acme Concrete	. 3/4 inch, 3000 psi pump (mix No. 6441) . 3/4 inch, 4000 psi pump (mix No. 6452) . 3/4 inch, 5500 psi pump (mix No. 6070)
Central Premix	. 3/4 inch, 3000 psi (mix No. 0300H) . 1-1/2 inch, 3000 psi (mix No. 0301H) . 3/4 inch, 4000 psi (mix No. 0302H) . 1-1/2 inch, 4000 psi (mix No. 0303H) . 3/4 inch, 5000 psi (mix No. 0304H) . 1-1/2 inch, 5000 psi (mix No. 0305H)

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

SECTION 01310  
PROGRESS SCHEDULES

PART 1 - GENERAL

1.1 REFERENCES: Not Used

1.2 SUBMITTALS: Refer to Section 01300 for submittal procedures.

1.2.1 Rate of Progress Schedule: Submit schedule as required in this Section.

1.2.2 CPM Project Schedule: Submit schedule as required in this Section.

1.3 RATE OF PROGRESS SCHEDULES

1.3.1 Progress schedules as identified in Section 5 of Contract General Conditions shall be submitted for approval, in accordance with the following.

1.3.1.1 Schedules shall be submitted after receipt of notice to proceed, as follows:

a. A schedule covering the first 60 calendar days of Contract activities, within 10 calendar days.

b. A schedule covering all Contract activities for the duration of the Contract, within 30 calendar days. Based on CPM Schedule required in Article 1.4.

1.3.1.2 The progress schedule shall show the order in which the Contractor proposes to carry on the work, the dates on which it will start the several salient features of the work including procurement of materials and equipment and contemplated dates for completion. Each schedule shall be in the form of a horizontal bar chart of suitable scale to indicate the percentage of work scheduled for completion at any time with a separate bar for each activity. At the end of each week or at the end of such other periods of time specified in the Contract, the Contractor shall prepare and submit 1 copy of such chart showing the actual progress at the end of such period.

1.3.2 Organize the schedule to show activities relative to each major subcontractor and supplier. Provide sub-schedule to define critical portions of the entire schedule.

1.3.3 The progress schedule shall include design activities and milestones, delivery date of design documents. Construction activities, progress milestones, and include but not be limited to the following activities.

1.3.3.1 Schedule of activities

a. Mobilization and bond.

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- b. Clear and grub site.
- c. Install water line.
  - 1) Excavate.
  - 2) Install pipe and valves.
  - 3) Sleeves under railroad tracks (each location).
  - 4) Fire hydrants.
  - 5) Backflow preventer and building.
  - 6) Test.
  - 7) Backfill.
- d. Building excavation.
- e. Form and pour foundation.
- f. Pour slab.
- g. Erect building.
  - 1) Structural steel.
  - 2) Roofing and siding.
- h. Install roll-up door.
- i. Install exhaust fans and louvers.
- j. Underground piping for sprinkler system.
- k. Sprinkler piping inside the building.
- l. Construct riser rooms.
- m. Electrical.
  - 1) Pole work.
  - 2) Underground electrical.
  - 3) Install 75 kVA transformer.
  - 4) Ground grid.
  - 5) Light fixtures.



- 6) Conduit and wires.
- 7) Distribution panels.
- 8) Fire alarm system.
- 9) Test fire alarm.
- n. Install CAM units.
- o. Test CAM units.
- p. Apply special protective coating.
- q. Stabilize around building.
- r. Gravel and pave roadways.
- s. Punchlist and demobilize.

1.3.4 The schedule shall show, as a minimum, the accumulated percentage of completion of each activity and total percentage of work completed as of the last work day of each month.

1.3.4.1 An "S" curve shall be developed from percentage of total work figures and superimposed on the Progress Schedule.

1.3.4.2 A dollar value or percent of total shall be shown next to each activity shown on the schedule. These figures will be the basis for determining the progress payments described in Section 01027.

#### 1.4 CPM PROJECT SCHEDULE

1.4.1 Prepare and submit for approval within 30 calendar days a CPM Project Schedule identifying critical path activities which includes the logical sequence and relationship of activities for engineering, design, submittals, procurement, fabrication, delivery, erection, installation and testing of work covered by this Contract.

1.4.2 Activity durations shall be in working days. Activities exceeding 20 working days shall be reduced by identifying logical subactivities. Activity titles shall be self-explanatory with abbreviations shown in a legend on the document. Indicate early start, early finish, late start, late finish, (restraining activities) and total float for activities. Highlight critical path activities to identify the project's critical path.

1.4.3 The CPM Project Schedule shall include but not be limited to the following activities.

a. All significant engineering functions performed prior to fabrication, such as specific procedures, and shop and field drawings, submitted for approval and approved.

- b. Major material acquisitions and delivery.
- c. Offsite fabrication and delivery schedules.
- d. All lower tier contractor activities.
- e. All field installation and nondestructive examination activities.
- f. Indications that work for each activity is to be performed on a single, double or triple shift, and that work is to be done on a 5, 6, or 7 day work week basis.
- g. Identification of inspection (hold) points.
- h. Manpower loading and leveling.
- i. Milestones indicating interface requirements with construction activities performed by others.
- j. *Pacing milestones. The following is a list of pacing milestones for the contractor to meet in the specified number of calendar days following notice to proceed.*

<u>Pacing Milestone</u>	<u>Calendar Days After NTP</u>
1. Complete building foundation (ready for slab)	80 days
2. Complete building slab (ready for structure)	115 days
3. Complete building (ready for turnover)	240 days

**NOTE:** Completion of all project work and turnover of the building for operation use within the time frame of contract is critical to the governments operation schedule. Failure to complete all contract work within the specified overall performance time could result in fines of up to \$5,000 per day which would be passed on to the KEH-5207 contractor as actual damages.

k. *Reference CPM Schedule. Appended is a reference CPM schedule with pacing milestones. This schedule is included as information to aid the contractor in developing the CPM required by paragraph 1.4.*

#### 1.5 BI-WEEKLY WORK SCHEDULE (Two Week Look Ahead)

1.5.1 The Contractor shall prepare and submit 2 copies of a detailed schedule of the next 2 week's work no later than noon of each Friday. The first work schedule shall be submitted within 10 working days after receipt

of the written notice of Contract award for review and approval. The schedule shall include the following as a minimum.

- a. Work description.
- b. Location of work.
- c. Work involving outages, overtime, weekends, etc.
- d. Inspection requirements.

## 1.6 REVISIONS TO SCHEDULES

1.6.1 Whenever KEH determines that there is a significant variance between actual and scheduled progress, endangering completion within the Contract completion time, KEH may require that Contractor prepare and submit a revised CPM and progress schedule.

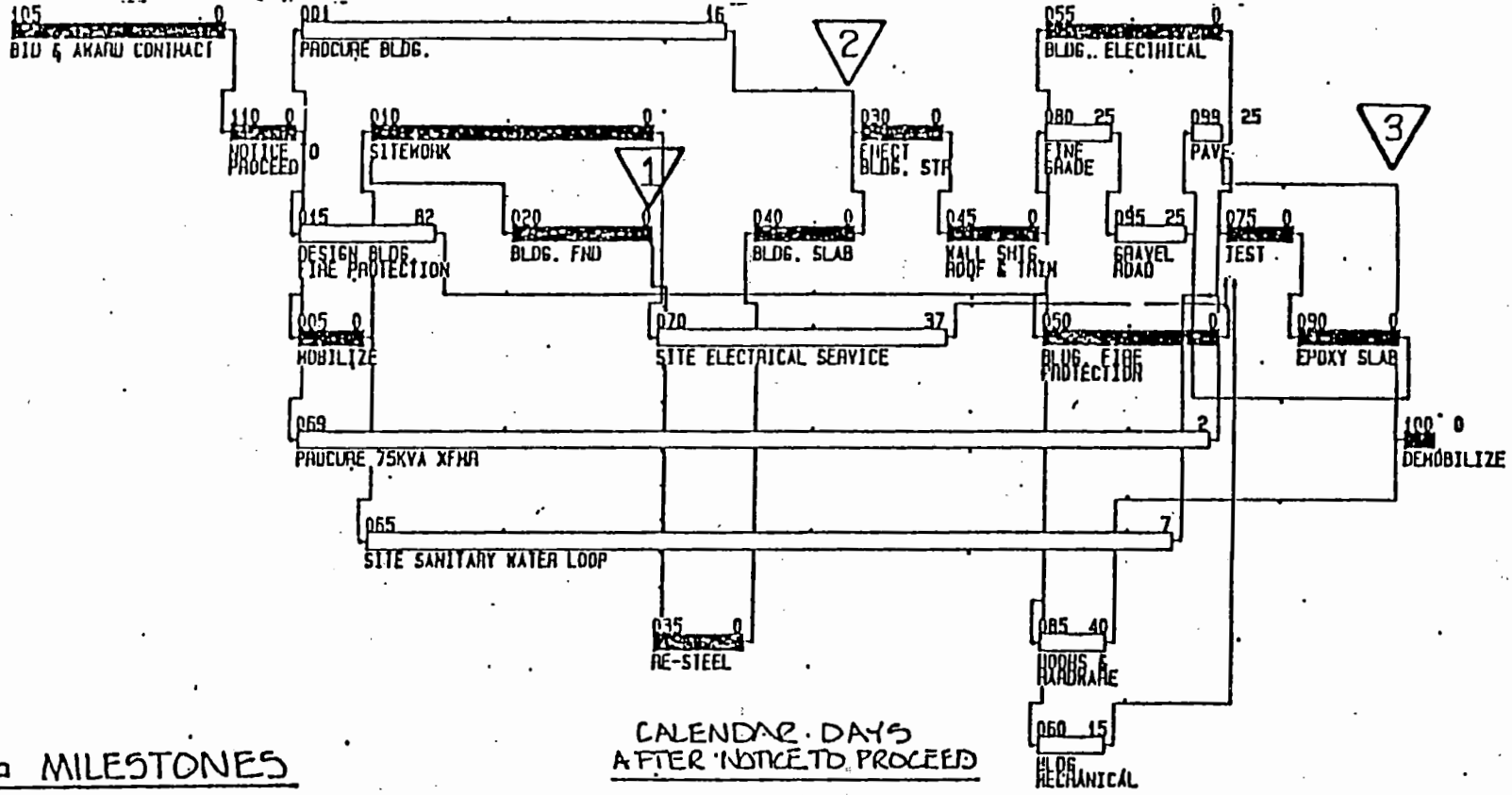
1.6.2 Indicate progress of each activity to date of submittal and projected completion date of each activity. Identify activities modified since previous submittal, major changes in scope, and other identifiable changes.

1.6.3 Provide narrative report to define problem areas, anticipated delays, and impact on schedule. Report corrective action taken, or proposed,

★  
NTP

CALENDAR DAYS

★  
CONTRACT COMPLETE



PACING MILESTONES

- 1 COMPLETE BUILDING FOUNDATION  
(READY FOR SLABS) 80 DAYS
- 2 COMPLETE BUILDING SLABS  
(READY FOR STRUCTURE) 115 DAYS
- 3 COMPLETE BUILDING  
(READY FOR TURNOVER) 240 DAYS

CALENDAR DAYS  
AFTER NOTICE TO PROCEED

Activity Bar/Early Date	
Critical Activity	
Program Bar	

KAISER ENGINEERS HANFORD		Sheet 1 of 1	
RADIOACTIVE MIXED WASTE STORAGE FACILITY			
W016			
Start : Project Finish :		CONTRACT NO KEH-5207	
Date Date: 1JAN90		Plot Date: 23JAN90	

REV.	REVISION	DATE

01310 - 4b

W-016H-C1  
As-Built Rev 1

ECN-

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and its effect, including the effect of changes on schedules of separate contractors.

1.6.4 Distribute copies of revised schedules to jobsite file, subcontractors, suppliers, and other concerned entities. Instruct recipients to promptly report, in writing, problems anticipated by projections shown in revised schedules.

1.6.5 If the Contractor fails to submit the progress schedule specified in Paragraph 1.3.1 within the time prescribed, or the updated progress schedule specified in Paragraph 1.6.1, within the requested time, KEH may withhold approval of progress payments until such time as the Contractor submits the required progress schedules.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

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SECTION 01400  
QUALITY ASSURANCE

PART 1 - GENERAL

1.1 REFERENCES: Not Used.

1.2 SUBMITTALS: Not Used.

1.3 INSPECTING AND TESTING

1.3.1 In accordance with Section 19 of Contract General Conditions, perform following.

1.3.1.1 Section 02650, Leak Testing.

1.3.1.2 Section 02668, Leak Testing.

1.3.1.3 Section 05500, Visual Weld Examination.

1.3.1.4 Section 09805, Concrete Surface Inspection.

1.3.1.5 Section 13120, inspect final installation of pre-engineered structures.

1.3.1.6 Section 15500, HVAC Testing.

1.3.1.7 Section 16300, Electrical Testing.

1.3.1.8 Section 16400, Electrical Testing.

1.3.1.9 Section 16720, Electrical Testing.

1.3.2 In accordance with Section 19 of Contract General Conditions, KEH will perform following.

1.3.2.1 Testing to determine moisture density relations and field in-place density of soils.

1.3.2.2 Sampling and testing of asphalt concrete pavement.

1.3.2.3 Preparation, collecting, and testing of concrete specimens.

1.3.2.4 Testing of special protective coating.

1.3.2.5 Dc testing of new cable at receipt.

1.3.2.6 Cable and transformer testing after installation.

1.3.2.7 Witness specific inspection and witness points.

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1.3.2.8 Perform final acceptance inspection.

### 1.3.3 Specific Inspection and Witness Points

1.3.3.1 Adhere to inspection points required. Ensure personnel have completed inspections of and approved portions of work in accordance with Contract requirements before notifying KEH.

a. Specific inspection and witness points are defined as follows.

1) Construction inspection (H): Required for witnessing of specific construction features, before further construction is allowed to proceed.

2) Receiving (R): Special items of fabrication, equipment, or material scheduled to be delivered to Project site or other designated location which require inspection upon arrival. Notify KEH within 4 hours after arrival of item.

3) Witness (W): Selected for inspection at option of KEH. Work may proceed upon verbal release by KEH or upon expiration of 1 hour beyond scheduled time of witness.

b. H, R, and W points apply to onsite work. Except where longer period is specified, notify KEH at least 4 working hours before each point for onsite work.

1.3.3.2 H, R, and W points are for following items and stages of work.

#### SITWORK

##### Earthwork

H - All compaction procedure demonstration

H - All backfilling operations

##### Road Subgrade And Granular Base

H - All compaction procedure demonstration

H - All backfilling operations

##### Hot-Laid Asphaltic Concrete

H - All compaction testing of hot-laid asphaltic concrete pavement

##### Piped Utilities

H - Initial flushing

W - All hydrostatic testing



### Fire Water Systems

- R - Arrival of backflow prevention assembly
- H - Initial flushing
- H - All hydrostatic testing
- H - Initial installation of backflow prevention system

### CONCRETE

#### Cast-In-Place Concrete

- H - All concrete placement
- H - Initial grout placement

### METALS

#### Metal Fabrications

- H - Initial welding

### THERMAL AND MOISTURE PROTECTION

#### Sealants And Calking

- H - Initial application of sealants and calking on concrete floor

### FINISHES

#### Special Protective Coating

- H - Prior to initial application

### SPECIAL CONSTRUCTION

#### Pre-Engineered Structures

- H - Initial erection of pre-engineered structures

### MECHANICAL

#### Fire Protection System

- H - All flushing of piping
- H - All pressure testing of piping

Heating, Ventilating, And Air Conditioning

- R - Arrival of wall exhauster
- H - All testing of HVAC system

ELECTRICAL

High Voltage Distribution (Above 600 Volts)

- R - Arrival of transformers/15 kV cable
- W - All electrical testing

Service And Distribution (600-Volts And Below)

- R - Arrival of transformers
- H - Initial cable pull
- H - Initial exothermic welding
- H - All meggering of conductors rated 600 volts and used for services, feeders or branch circuits over 150 volts to ground, phase-to-phase, and phase-to-ground
- W - All remainder electrical testing
- H - Final closure of all electrical enclosures

Alarm And Detection Systems

- W - All continuity testing of fire alarm circuits
- H - All acceptance test procedures

1.4 OPEN ITEM DEFICIENCY AND NONCONFORMANCE REPORTING

1.4.1 KEH utilizes open item deficiencies and nonconformance reports to document deviations from Contract requirements.

1.4.1.1 Open item deficiency: Documented on open item lists available from KEH on request. Can be corrected by Contractor without additional direction. Correction shall bring item into compliance with Contract requirements, using approved rework procedures or standards without violating application specifications, codes, or standards.

1.4.1.2 Nonconformance report: Documented on nonconformance report (NCR). NCRs document deviations from Contract requirements when characteristic, documentation, or procedure renders quality of item or activity unacceptable or indeterminate. Identified by blue NCR tag, or red construction hold tag. Hold tag prohibits movement, installation, processing or further fabrication of nonconforming items pending approval of NCR disposition. NCR tag identifies nonconformance but does not preclude movement, installation, processing, or further fabrication of item. No action shall be taken to correct or alter actual condition before receipt of approved disposition. Tags are not to be removed by anyone other than agency who applied tag.

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1.4.2 Contractor shall ensure its organization is represented by individuals with sufficient authority to commit Contractor to corrective action requirements identified by KEH.

1.4.3 Open item deficiencies and nonconformances reported during performance of Contract require resolution before completion and final payment.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

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## SECTION 01500

### CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

#### PART 1 - GENERAL

##### 1.1 REFERENCES

###### 1.1.1 National Fire Protection Association (NFPA)

NFPA 701

Standard Methods of Fire Tests  
for Flame-Resistant Textiles and  
Films, 1989 Edition

###### 1.1.2 Washington State Department of Transportation (WSDOT)

M41-10-88

Standard Specifications for Road,  
Bridge, and Municipal  
Construction

##### 1.2 SUBMITTALS: Refer to Section 01300 for submittal procedures.

##### 1.3 CONSTRUCTION FACILITIES

1.3.1 First Aid: Facilities are available at Building 2719WA in the 200 West Area to provide first line medical attention.

1.3.2 Operation and Storage Areas: The onsite operations of the Contractor including storage of materials shall be confined to area adjacent to the worksite as designated in the field by KEH.

1.3.3 Disposal Site for Waste: Disposal of excess excavation, broken asphalt, and broken concrete shall be at a site approximately 12 road miles from the project location. The disposal site is open only during regular working hours as stated in these Contract Documents.

##### 1.4 TEMPORARY UTILITIES

###### 1.4.1 Water

###### 1.4.1.1 Construction water

a. Water for construction purposes will be made available from a standpipe near 200 West Access Gate adjacent to the worksite. Hauling, dispensing, and temporary piping shall be at the Contractor's expense. Fittings furnished by the Contractor for connection to the water source must be approved by KEH before installation. The Contractor shall remove all temporary piping, hoses, fittings, and valves before final acceptance of the work.

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b. Water will be made available from an existing hydrant in the vicinity of each worksite. A 4-1/2 inch, National Standard Thread, 1/4 turn ball valve with a female swivel to a 4-inch sexless "Snap-Tite/Storz" quick connect coupling shall be connected to the 4-1/2 inch port for Fire Department use only. A reduced pressure backflow preventer, BEECO-AERGAP Model 6CM or approved, and a slow-opening 2-1/2 inch gate valve shall be installed on each hydrant port intended for construction use. A slow-opening valve will prevent water hammer. The hydrant wrench, backflow preventers and all valves shall be furnished by the Contractor. The wrench shall remain on the hydrant at all times. When used, the hydrant shall be turned "Full-on" or "Full-off". Partial opening causes damage to the hydrant. The hydrant shall be turned off at the end of each work day. The Contractor shall provide freeze protection for the hydrant and temporary piping or hoses. All temporary pipe or hose extensions shall be furnished by the Contractor. Fittings provided by the Contractor for connection to water source shall be approved by KEH prior to installation. Before final acceptance of the contract work, the Contractor shall remove all temporary piping, hoses and valves installed by him.

NOTE: Contractor is required to notify KEH prior to each opening of hydrant.

1.4.1.2 Drinking water: Water for drinking purposes will be made available within the 200 West Area. The Contractor is responsible for furnishing adequate drinking water to his employees that conforms to health and safety requirements.

1.4.2 Electrical Power: Temporary power 240-120V ac will be made available at a power pole near the site assigned for the field office. All power lines or cable extensions, including transformers, protective equipment, switches, and fixtures beyond the point of supply shall be furnished by the Contractor. All temporary installations made by the Contractor shall be removed upon completion of construction under this contract.

#### 1.4.3 Telephone

1.4.3.1 The telephone system within the Administratively Controlled Area at the Hanford Site is operated by General Telephone Company of the Northwest, Inc. Upon request of the Contractor, KEH will arrange for telephone service at the construction offices of the Contractor and its subcontractors, if facilities for such services are available. KEH will charge the Contractor for installation and services in accordance with the charge assessed by General Telephone Company. Those charges will be determined on the basis of published tariffs. Information of tariffs may be obtained from DOE's Site Services Contractor, office of the Manager of the Plant Telephone and Radio, Telephone 376-6322.

1.4.3.2 All of the above charges will be deducted from payments due the Contractor. The Contractor and its subcontractors may use provided telephones for long distance calls necessary to the performance of the work.

All such calls must be made by use of a valid credit card and the cost of such calls shall not be charged to the Site Services Contractor or KEH.

1.4.4 Sanitary Facilities: The Contractor shall furnish and service chemical or other approved sanitary toilets for use of his employees. The facilities shall conform to requirements of KEH which are available upon request.

## 1.5 ACCESS ROADS AND PARKING AREAS

1.5.1 Access to 200 East Area shall be through Access Gate No. 814. Access to 200 West Area shall be through the main gate.

1.5.2 Parking for Contractor's company vehicles will be made available in the vicinity of the work outside the limited area. "No Parking" signs are posted to indicate fire and emergency lanes. No on-street parking will be allowed.

1.5.3 Grass Fire Prevention: To reduce the potential for grass fires, all off-road driving shall be kept to a minimum. Each vehicle driving off-road or to remote locations, shall carry a portable fire extinguisher (10 pound ABC dry chemical, minimum), communications equipment consisting of a two-way radio or mobil phone (CB type radios are not acceptable) and a shovel. All fires shall be reported immediately to the nearest Hanford Patrol and the Hanford Fire Department.

## 1.6 TEMPORARY CONTROLS

1.6.1 Dust Control: The Contractor shall maintain all work areas to prevent a hazard or nuisance to others. Dust control shall be accomplished by sprinkling or other methods as approved by KEH. Sprinkling shall be repeated at such intervals to keep all parts of the disturbed area at least damp at all times, and the Contractor must have sufficient equipment on the job to accomplish this. Dust control shall be performed as the work proceeds and whenever a dust nuisance or hazard occurs. No separate or direct payment will be made for dust control and the cost thereof shall be considered incidental to and included in the Contract price.

1.6.2 Temporary Enclosures: Plastic sheeting materials used to form enclosures shall have minimum thickness of 14 mils and have fire retardant capabilities meeting the requirements of NFPA 701. Acceptable manufacturers are Winman Corporation (Plastic Division), St. Cloud, Minnesota; Lancs Industries, 1270 N.E. 124th Street, Kirkland, Washington 98034; and Protective Plastics, Inc. 230 Silver Creek Road, Greer, South Carolina 29651. Other manufacturers may be submitted to KEH for approval.

1.6.3 Traffic Control: Temporary traffic control and barricades shall be in accordance with WSDOT M41-10, Section 1-07.23(3).

1.6.3.1 Movement of vehicles and equipment: Slow moving vehicles and equipment shall not travel on Hanford Site roads during heavy traffic periods

between 6:30 A.M. and 8:00 A.M., and 3:30 P.M. and 5:30 P.M. Vehicles and equipment shall not block existing roads or park on roadway shoulders.

1.6.3.2 Oversize load or vehicle: Travel of oversized load or vehicle is restricted to the hours between 9:00 A.M. and 2:30 P.M. Site permit specified in Section 01065 is required when the load or vehicle exceeds the following dimensions:

- Width 8 feet 6 inches
- Height 14 feet
- Length 40 feet (Single unit)  
48 feet (Single trailing unit)

a. Oversized Load Identification: All vehicles or loads exceeding 8 feet 6 inches in width shall have an oversized load sign displayed on the front of the towing vehicle and on the rear of the trailing unit. Red flags shall be attached to each corner of the oversized load or vehicle.

b. Escort Vehicle(s): Escort vehicles shall be equipped with oversized load signs and amber lights. On two-lane highways, escort vehicles are required in the front and rear of a load or vehicle over 10 feet wide. For multiple-lane highways, an escort vehicle is required in the rear of a load or vehicle over 14 feet wide and on the front and rear of a load or vehicle over 20 feet wide.

c. Electrical Escort: A qualified electrical escort (journeyman lineman) is required when the load or vehicle reaches a height of 14 feet or higher from the road surface, or when a clearance of at least 6 feet cannot be maintained from overhead electrical or signal lines.

## 1.7 FIELD OFFICE

1.7.1 A field office equipped and staffed to conduct efficiently the work under this Contract shall be established by the Contractor. A copy of all Drawings, Specifications and other information pertinent to the proper and efficient prosecution of the Contract work shall be kept by the Contractor at this office, and the authorized representative of KEH shall have access thereto at all times. Telephone service will be made available at the Contractor's field office as set forth in Paragraph 1.4.3 providing such service is available. The Contractor may utilize existing telephones at buildings to be designated in the field by KEH for local calls.

1.7.2 All portable or relocatable structures, including trailers utilized by Contractor for field offices or storage shall be anchored or tied down to prevent overturning and lateral movement in winds up to 70 mph. The underfloor area shall be enclosed or skirted with material that will not burn or support combustion. The purpose of this requirement is for prevention of wind-blown debris accumulation and the use of underfloor space for material storage. Anchoring and enclosure shall be in accordance with anchoring and enclosure methods submitted and shall be completed within 14 days of arrival on site.



PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

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SECTION 01610

TRANSPORTATION AND HANDLING

PART 1 - GENERAL

1.1 REFERENCES: Not Used

1.2 SUBMITTALS: Not Used

1.3 RAILROAD AVAILABLE

1.3.1 Railroad shipments are possible into the boundaries of the Hanford Site. If the Contractor elects to utilize rail transportation the shipments shall be accomplished in accordance with this Section.

1.3.2 Carload shipments may be made to Richland, Washington, over Washington Central Railroad from Burlington Northern or Union Pacific Railroads. KEH will arrange for movement of rail cars from Richland to any available spurs or sidings on the Government owned railroad system within the Hanford Site. KEH is not liable for demurrage charges, or for loss or damage to the car or lading, unless loss or damage is due to the fault or negligence of KEH.

1.3.3 The Contractor shall make his own investigation as to availability of rail spurs or sidings in the vicinity of the worksite. Use of spurs will be coordinated with other users at the Site. The Contractor shall notify KEH not less than two working days before the scheduled arrival of carload shipments.

1.3.4 Equipment and labor required for unloading, transporting, and handling shall be furnished by the Contractor. Each carload must be unloaded within three working days after arrival, unless time extension is granted by KEH.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

## SECTION 01630

### PRODUCT OPTION AND SUBSTITUTION

#### PART 1 - GENERAL

1.1 REFERENCES: Not Used

1.2 SUBMITTALS: Refer to Section 01300 for submittal procedures.

#### 1.3 GENERAL

1.3.1 Products include material, equipment and systems and shall meet the requirements of the Specifications and referenced standards.

1.3.2 Material and workmanship shall meet requirements of Section 13 of the Contract General Conditions.

1.3.3 Components required to be supplied in quantity within Specification sections shall be the same and be interchangeable.

1.3.4 Do not use materials and equipment removed from existing structure, except as specifically required, or allowed, by Contract Documents.

#### 1.4 PROCEDURES

1.4.1 Submittal of Substitution Approval Request Form 1151.00, sample appended, not required when product is specified by reference standards or by description and proposed product meets the standards.

1.4.2 Submittal of Form 1151.00 required when product is specified by naming models of 1 or more manufacturers and product not named.

#### 1.4.3 Limitations on Substitutions

1.4.3.1 Substitutions will not be considered when indicated or implied on fabricator drawings or product data submittals without separate formal request, when requested directly by subcontractor or supplier, or when acceptance will require substantial revision of Contract Documents.

1.4.3.2 Substitute products shall not be ordered or installed without written acceptance.

1.4.3.3 Only 1 request for substitution for each product will be considered. When substitution is not accepted, provide specified product.

1.4.3.4 KEH will determine acceptability of substitutions based on technical requirements and cost related to substitution incurred by KEH.

#### 1.4.4 Requests for Substitutions

1.4.4.1 Submit separate request for each substitution using Form KEH 1151.00. Document request with complete data substantiating compliance of proposed substitution with requirements of Contract Documents.

1.4.4.2 Identify product by Specification Section and Article or Paragraph numbers. Provide manufacturer's name and address, trade name of product, and model or catalog number. List fabricators and suppliers as appropriate.

1.4.4.3 Attach as minimum product data specified in Section 13 of the Contract General Conditions.

1.4.4.4 Give itemized comparison of proposed substitution with specified product, listing variations, and reference to Specification Section and Article or Paragraph numbers.

1.4.4.5 Give quality and performance comparison between proposed substitution and specified product.

1.4.4.6 List availability of maintenance services and replacement materials.

1.4.4.7 State effect of substitution on construction schedule, and changes required in other work or products. If substituted product requires or necessitates revisions to structures, foundations, footings, services, systems, piping, electrical, etc, cost of engineering and construction shall be borne by Contractor. Contractor shall submit for approval drawings, calculations, and vendor data which clearly show revisions to accommodate substitution.

#### 1.4.5 Contractor Representation

1.4.5.1 Request for substitution constitutes representation that Contractor has investigated proposed product and has determined it is equal to or superior to specified product.

1.4.5.2 Contractor shall provide same warranty for substitution as for specified product.

1.4.5.3 Contractor shall coordinate installation of accepted substitute, making changes required for work to be completed.

1.4.5.4 Contractor waives claims for additional costs related to substitution which may later become apparent.

1.4.5.5 Contractor waives claim for additional performance time resulting from product substitution.

1.4.6 Submittal

1.4.6.1 Submit 13 copies of request for substitution.

1.4.6.2 KEH will review Contractor's request for substitutions with reasonable promptness.

1.4.6.3 For accepted products, submit fabricator drawings, product data, and samples required in Section 01300.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

From (Contractor) \_\_\_\_\_ Contract No. \_\_\_\_\_

Project \_\_\_\_\_

Description of Proposed Substitution \_\_\_\_\_

We hereby submit for consideration the following product instead of specified item for above project:

Specification No. \_\_\_\_\_ Section \_\_\_\_\_

Drawing No. \_\_\_\_\_ Section or Zone \_\_\_\_\_

Specified Item \_\_\_\_\_

Proposed Substitution \_\_\_\_\_

Attach complete technical data, including laboratory tests and samples, as applicable.

Provide detailed comparison of the significant qualities (system performance, interface requirements, size weight, durability, performance and similar characteristics, and including visual effect where applicable) for the proposed substitution of comparison with the original requirements.

Describe other changes to drawings and specifications required by proposal as outlined below and attach additional information as necessary.

**Complete Each Item**

A. Changes to drawing dimensions \_\_\_\_\_

B. Effect of substitution on other systems \_\_\_\_\_

C. Outline differences between proposed substitution and specified item \_\_\_\_\_

D. Manufacturer's guarantees of proposed and specified items are:

\_\_\_\_\_ Same \_\_\_\_\_ Different (explain on attachment)

Undersigned attests function, and quality equality equivalent or superior to specified item and has reviewed General Conditions paragraph GC-13 for assignment of responsibility if the substitution is approved.

Submitted By

Signature

Address

Date

Phone

SECTION 01720  
PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 REFERENCES: Not Used

1.2 SUBMITTALS: Not Used

1.3 RECORD REQUIREMENTS

1.3.1 The nature of the work at the Hanford Site requires that certain documents, as defined herein, be held to record the construction process and the administration of the Contract. KEH is responsible for assembling all pertinent data for final disposition. The Contractor is responsible for preparing, preserving, and delivering those Project Record Documents to KEH required by this Contract. These documents are in addition to those submittals required in Section 01300.

1.3.2 Project Record Documents shall be marked by the Contractor to identify those copies for record and to prevent their use for construction. Record copies of construction documents shall be kept in the Contractor's Field Office and shall be available to KEH during the progress of the work.

1.3.3 Some data required for Project Records are delivered to KEH during the course of construction and contract administration, while other required records are assembled after completion of construction for delivery to KEH. In all situations the Contractor is required to document the delivery by retaining a copy of reports delivered during course of work until construction completion, retaining a copy of letter of transmittal itemizing delivered items, or other means acceptable to KEH.

1.4 PROJECT RECORD DOCUMENTS

1.4.1 General: The documents required for Project Record are itemized herein. Each document shall be identified by Title or Number and shall be complete. All notes or markings added by hand shall be legible utilizing a permanent non-smearing marking media, such as ink or felt tip markers, in contrasting color.

1.4.2 Contract Documents: One set of Drawings and the Contract Documents, including Addenda and Modifications to the Contract, shall be stored in the Field Office apart from documents used in construction and shall be maintained in a clean, dry, and legible condition. Legibly mark each item to record actual construction, including changes to dimensions and details, manufacturer's name, catalog number, and substitute products.

1.4.3 Certified Payrolls: Each week certified payrolls, as required by Section 108 of the Contract General Conditions, shall be filed with KEH and copies kept in Field Office until Contract completion. No progress payments

will be processed unless all certified payrolls for the work period have been received by KEH.

1.4.4 Daily Force and Equipment Report: Before noon each day, the Contractor shall furnish to KEH one copy of a detailed Daily Force Report covering all labor and supervision of the Contractor and each of his lower tier contractors for the previous day. The report shall include a general description of the work performed and list major items of equipment on-site.

1.4.5 Weekly Manpower Report: A weekly manpower report completed daily and submitted weekly (before 10:00 a.m. on Monday for the previous week) is required during the performance period of subject Contract. Forms for Contractor's use in documenting the foregoing will be furnished by KEH.

1.4.6 Backfill Permits: Retain all backfill permits approved for the work as required in Section 02200.

1.4.7 Soil Compaction Procedure: Retain all Forms KEH-382 completed for the work as required in Section 02200 and Section 02235.

1.4.8 Soil and Asphalt Tests: If the Contractor elects to test any soil or asphalt or to have independent test performed, copies of such tests shall be given to KEH.

1.4.9 Pour Slips: After obtaining KEH approval of concrete pour slip required in Section 03300, give copy to KEH and retain Contractor copy until Contract closeout and then forward to KEH.

1.4.10 Trip Tickets: Deliver to KEH with each truck load of concrete as required in Section 03300 and retain Contractor copy until Contract closeout and then forward to KEH.

1.4.11 Concrete Tests: If the Contractor elects to test concrete or to have independent tests performed, copies of such tests shall be given to KEH.

1.4.12 Flushing/Cleaning Documentation: Provide documentation required in Section 02668 that flushing and cleaning have been accomplished.

1.4.13 Leak/Pressure Testing: Provide documentation that testing required in Section 02668 has been accomplished.

1.4.14 Pre-engineered Structures: Final inspection documentation.

1.4.15 Electrical Test Reports: Provide reports of all tests as required in Sections 16300, 16400, and 16720.

1.4.16 Product Samples and Manufacturer's Instructions: In addition to submittals required in Section 01300 and requirements of this Section, any information received by the Contractor from suppliers that can document products used and how products were installed shall be forwarded to KEH for Project Records.

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PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

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SECTION 02200

EARTHWORK

PART 1 - GENERAL

1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

1.1.1.1 American Society for Testing and Materials (ASTM)

D 653-88

Standard Terminology Relating  
to Soil, Rock, and Contained  
Fluids

1.1.1.2 Washington State Department of Transportation (WSDOT)

M41-10-88

Standard Specifications for  
Road, Bridge, and Municipal  
Construction

1.2 SUBMITTALS: Refer to Section 01300 for submittal procedures.

1.2.1 Method to Prevent Damage During Excavation: Submit procedures proposed to prevent overstressing existing structures or interrupting service to existing facilities.

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 General: Obtain select soils from excavation or other designated locations. Obtain on-site approval for soils.

2.1.2 Fill or Backfill

2.1.2.1 Structural: Well graded soil mixtures which may contain cobbles up to 3 inches in greatest dimension if uniformly distributed and not constituting more than 20 percent of volume of fill.

2.1.2.2 Common: Well graded soil mixtures containing cobbles up to 8 inches in greatest dimension if uniformly distributed and not constituting more than 40 percent of volume of fill.

2.1.2.3 Select fill: Excavated sandy material having less than 20 percent by volume gravel particles and maximum dimension of 1/2 inch.

2.1.3 Bedding for Underground Pipe and Conduit: Sand, defined in ASTM D 653.

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2.1.4 Stabilization: Gravel, in accordance with WSDOT M41-10, Section 9-03.9(3), *Top Course*.

ECN-7  
ECN-39

2.1.5 Plastic Sheet Marker: 6 inch wide nondetectable tape similar to "Terra Tape" manufactured by Griffolyn Co, Inc. Tape shall be imprinted with warning such as "Caution Buried Installation Below" at intervals of not more than 4 feet.

### PART 3 - EXECUTION

#### 3.1 EXCAVATION

3.1.1 Before performing excavation, obtain excavation permit. Excavation permits will be furnished as set forth in Section 01065.

3.1.2 Locate and expose underground utilities by hand tools. Use of heavy equipment and machinery is subject to approval of KEH.

3.1.3 Shore excavations more than 4 feet deep and with sides sloped steeper than 1-1/2 horizontal to 1 vertical. Install shoring as excavation progresses and remove as backfilling is accomplished.

3.1.4 Do not store excavated or other material closer than 2 feet from edge of excavation unless barrier is erected to retain excavated materials. Store and maintain materials in manner that they are prevented from falling or sliding into excavation.

3.1.5 Wherever slopes of excavations will intersect existing underground lines or structures such as building foundations, underground piping, electrical ducts or direct buried electrical lines, install shoring or other means of support to prevent overstressing existing structure or underground lines or to prevent interrupting service to existing buildings.

#### 3.1.6 Footings and Foundations

3.1.6.1 Make excavations for footings to depth shown on the Drawings or to further depth as necessary to provide undisturbed surface to receive footing. Make excavations to proper width with allowances made for forms and bracing. Make bottom of excavations compact, level, true, and free of loose material.

3.1.6.2 If over-excavation occurs where footings are designed to be placed on undisturbed earth, correct at time of placing concrete by extending concrete down to undisturbed earth, or by placement of backfill, compacted in accordance with subparagraph 3.2.1.2b, Method C.

#### 3.1.7 Trenches for Underground Piping and Conduit

3.1.7.1 Make excavations to line and grade shown on the Drawings and wide enough to make connections. Excavate with near vertical sides from bottom of trench up to 1 foot above utility lines. Excavate trench deep enough to

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permit placement of compacted sand bedding, 4 inches minimum thickness, beneath lines except where excavation is in undisturbed sand which will serve as bedding or where lines are to be encased in concrete. Pare holes in trench bottoms for pipe couplings so pipe will bear full length of barrel or section.

3.1.7.2 Install shoring to hold materials and surcharge pressure for full depth of trench.

3.1.7.3 Keep trenches free of standing water when laying is in progress.

3.1.7.4 If over-excavation occurs, correct by placement of structural backfill.

3.1.8 Where stabilization is required, finish subgrade 3 inches below elevations shown on the Drawings.

## 3.2 INSTALLATION

### 3.2.1 Fill and Backfill

#### 3.2.1.1 General

a. Backfill Permit: Do not start fill or backfill without approved permit as set forth in Section 01065.

b. Remove debris and organic matter from area to be filled or backfilled.

c. Use only select materials for fill or backfill. Keep materials free of frozen particles, lumps, organic matter and trash.

d. Do not place fill or backfill on frozen ground.

e. Filling or backfilling by sluicing or flooding with water will not be permitted.

f. Bring fill or backfill up evenly on sides of walls, structures and utility lines to avoid unbalanced loading.

g. Do not place fill or backfill against concrete structure or foundation wall less than 14 days after completion of structure or wall unless written permission from KEH is obtained. Provide wall support, where noted on the Drawings, before filling or backfilling.

#### 3.2.1.2 Structural and Select

a. Before placement of fill or backfill, demonstrate, to KEH by physical test at site, that procedure proposed for installation and compaction of soils will provide degree of compaction specified. Prepare "Soil Compaction Procedure" Form KEH-382, sample appended, in accordance with printed instructions. Forms will be furnished by KEH.

b. Place backfill in accordance with WSDOT M41-10, Section 2-03.3(14)C and approved procedure as follows.

- 1) Use Method C under foundations, slabs and pipelines.
- 2) Use Method B under pavements and roads, and within 5 feet of buildings, fences, other structures, or poles supporting electric lines or pipe.

c. Compaction control tests will be in accordance with WSDOT M41-10, Section 2-03.3(14)D.

#### 3.2.1.3 Common

a. Place fill or backfill in layers not more than 12 inches thick, loose measurement.

b. Compact each layer, full width, by at least 1 pass of vibratory or rammer type compactor, pneumatic-tired roller, loaded scraper wheel, grader wheel or power roller.

c. Mound over top layer of backfill to depth of 1 inch for each 12 inches of trench depth to maximum mound height of 6 inches.

#### 3.2.1.4 Underground piping and conduit trenches

a. Bedding placed beneath utility lines in trenches shall be material meeting the requirements of Paragraph 2.1.3.

b. Place and compact bedding in trench prepared according to subparagraph 3.1.7.1 before laying utility lines. Compact bedding as specified for structural backfill.

c. Place backfill over joints in underground pipes only after pressure testing of line has been completed.

d. Backfill under conduit and haunches of pipe, around sides, and up to 1 foot above top of pipe or conduit with bedding material. Place and compact material same as specified for structural backfill. Compact with care, to avoid misalignment of pipe and provide uniform bearing along barrel of pipe.

e. Backfill utility trenches from elevation 1 foot above top as follows.

- 1) For locations specified in subparagraph 3.2.1.2, use structural backfill.

- 2) Use common backfill in accordance with subparagraph 3.2.1.3 for other locations.

f. Do not allow heavy construction equipment to pass over buried lines until at least 2 feet of backfill has been placed over line or until bridging has been placed across trenching and approved by KEH.

3.2.2 Plastic Sheet Marker: Place continuous over buried utility lines. Place marker tape directly over line and 1 foot below finish grade. Place marker over each outside pipe of multiple lines. Place intermediate markers at maximum of 4 feet apart.

### 3.2.3 Finish Grading and Stabilization

3.2.3.1 Rake area disturbed by work, remove surface stones larger than 6 inches and dispose of excess material and debris at area designated by KEH.

3.2.3.2 Stabilize area disturbed by work and as indicated on the Drawings with 3 inch course of gravel meeting the requirements of Paragraph 2.1.4. Finish stabilization course to elevations shown on the Drawings.

### 3.3 FIELD QUALITY CONTROL

3.3.1 Soil Compaction Tests: Sampling and testing of compacted fill and backfill will be performed by KEH.

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# SOIL COMPACTION PROCEDURE

<b>A</b>	Project Number	Project Title			Date			
	Contract Number	Procedure Number		Location of Demonstration				
	<b>REQUIREMENTS</b>				<b>EQUIPMENT DEMONSTRATED</b>			
	Applicable Spec./Dwg.				Type			
	Compaction Required %				Manufacturer			
	Maximum Lift Size				Model			
<b>B</b>	<b>LABORATORY SOIL TEST RESULTS</b>							
	<div style="display: flex; justify-content: space-between;"> <div> <input type="checkbox"/> Non-granular Materials (WSDOT Test Method No. 609)              Maximum Density _____ Moisture % _____         </div> <div> <input type="checkbox"/> Granular Materials (WSDOT Test Method No. 606-A)  <input type="checkbox"/> Density Chart Attached         </div> <div> <input type="checkbox"/> In-Situ              Density _____         </div> </div>							
<b>C</b>	<b>COMPACTION DEMONSTRATION TEST RESULTS</b>							
	Formula for Percent Compaction: $\frac{\text{dry density}}{\text{max density}} \times 100 = \text{Percent Compaction}$							
	No. of Passes	Depth of Lift	Percent Moisture	Lbs/ft <sup>3</sup> Dry	Maximum Density	Percent Compaction	Accept	Reject
Observations or Comments								
TEST METHOD USED FOR DEMONSTRATION <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <div> <input type="checkbox"/> Nuclear Gage (ASTM D2922 &amp; D3017)                 </div> <div> <input type="checkbox"/> Other  <div style="border-bottom: 1px solid black; width: 100%;"></div> <div style="border-bottom: 1px solid black; width: 100%;"></div> </div> </div>								
<b>D</b>	Contractor Representative					Date		
	Engineer/Constructor Inspector					Date		



## INSTRUCTIONS

This Soil Compaction Procedure form, when approved by the Engineer/Constructor Inspector, documents witnessing and verifying the compaction procedure.

Section A is the responsibility of the Construction Contractor. It is to be completed at the time of backfill compaction demonstration and presented to the Engineer/Constructor Inspector.

Section B is completed by the Engineer/Constructor Inspector. Data entered is obtained from the agency or individual that performed testing.

Section C is completed by the Engineer/Constructor Inspector as the demonstration is performed. Using the applicable formula, the percent compaction achieved is determined and entered. Acceptance is based on the results as compared with the compaction percent required in Section A.

Section D is signed and dated by the Construction Contractor Representative acknowledging responsibility for this procedure and compliance thereto for applicable backfill operations. Section D is signed and dated by the Engineer/Constructor Inspector to signify witnessing and verification.

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END OF SECTION

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## SECTION 02235

### ROAD SUBGRADE AND GRANULAR BASE

#### PART 1 - GENERAL

##### 1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

##### 1.1.1.1 Washington State Department of Transportation (WSDOT)

M41-10-88

Standard Specifications for  
Road, Bridge, and Municipal  
Construction

1.2 SUBMITTALS: Refer to Section 01300 for submittal procedures.

#### PART 2 - PRODUCTS

##### 2.1 MATERIALS

##### 2.1.1 Subgrade Fill and Backfill

2.1.1.1 General: Obtain select soils from excavation or other designated locations. Obtain on-site approval for soils.

2.1.1.2 Fill or backfill: Well graded soil mixtures which may contain cobbles up to 3 inches in greatest dimension if uniformly distributed and not constituting more than 20 percent of volume of fill.

##### 2.1.2 Granular Base

2.1.2.1 Base course: Meeting the requirements of WSDOT M41-10, Section 9-03.9(3), Base Course Classification.

2.1.2.2 Leveling course: Meeting the requirements of WSDOT M41-10, Section 9-03.9(3), Top Course Classification.

2.1.2.3 Crushed gravel shoulder: Same as leveling course.

#### PART 3 - EXECUTION

##### 3.1 EXCAVATION

3.1.1 Before performing excavation, obtain excavation permit. Excavation permits will be furnished as set forth in Section 01065.

3.1.2 If over-excavation occurs, correct by placement of backfill as specified in subparagraph 3.2.2.2.

### 3.2 INSTALLATION

#### 3.2.1 Subgrade Filling and Backfilling

3.2.1.1 Remove debris and organic matter from area to be filled or backfilled.

3.2.1.2 Use only select materials for fill or backfill. Keep materials free of frozen particles, lumps, organic matter and trash.

3.2.1.3 Do not place fill or backfill on frozen ground.

3.2.1.4 Filling or backfilling by sluicing or flooding with water will not be permitted.

#### 3.2.2 Fill or Backfill

3.2.2.1 Before placement of fill or backfill, demonstrate, to KEH by physical test at site, that procedure proposed for installation and compaction of soils will provide degree of compaction specified. Prepare "Soil Compaction Procedure" Form KEH-382, sample appended, in accordance with printed instructions. Forms will be furnished by KEH.

3.2.2.2 Place backfill under roads in accordance with WSDOT M41-10, Section 2-03.3(14)C, Method B.

#### 3.2.3 Granular Base

3.2.3.1 Before placement of granular base, demonstrate, to KEH by physical test at site, that procedure proposed for installation and compaction of base will provide degree of compaction specified. Prepare "Soil Compaction Procedure" Form KEH-382, sample appended, in accordance with printed instructions. Forms will be furnished by KEH.

3.2.3.2 Construction Requirements: Construction shall be in accordance with following sections of WSDOT M41-10.

- a. Subgrade: Section 2-06.3.
- b. Equipment: Section 4-04.3(1).
- c. Mixing: Section 4-04.3(3).
- d. Placing and spreading: Section 4-04.3(4).
- e. Miscellaneous requirements: Section 4-04.3(7).
- f. Weather limitations: Section 4-04.3(8).
- g. Hauling: Section 4-04.3(9).

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### 3.2.3.3 Shaping and Compacting

a. Final shaping before compacting shall be accomplished using approved equipment and shall be in accordance with WSDOT M41-10, Section 4-04.3(5).

b. Compaction control tests will be in accordance with WSDOT M41-10, Section 2-03.3(14)D.

3.2.3.4 Shoulders: Construct shoulders, of width shown on the Drawings, after placement of asphaltic wearing course.

3.2.4 Finish Grading and Stabilization: Rake area disturbed by work, remove surface stones larger than 6 inches and dispose of excess material and debris at area designated by KEH.

### 3.3 FIELD QUALITY CONTROL

3.3.1 Sampling and testing of compacted fill and backfill will be performed by KEH.

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# SOIL COMPACTION PROCEDURE

<b>A</b>	Project Number	Project Title			Date		
	Contract Number	Procedure Number		Location of Demonstration			
	<b>REQUIREMENTS</b>				<b>EQUIPMENT DEMONSTRATED</b>		
	Applicable Spec./Dwg				Type		
	Compaction Required %				Manufacturer		
	Maximum Lift Size				Model		
<b>LABORATORY SOIL TEST RESULTS</b>							
<b>B</b>	<input type="checkbox"/> Non-granular Materials (WSDOT Test Method No. 609) <input type="checkbox"/> Granular Materials (WSDOT Test Method No. 606-A) <input type="checkbox"/> In-Situ						
	Maximum Density _____		Moisture % _____		<input type="checkbox"/> Density Chart Attached		Density _____
<b>COMPACTION DEMONSTRATION TEST RESULTS</b>							
<b>C</b>	Formula for Percent Compaction: $\frac{\text{dry density}}{\text{max density}} \times 100 = \text{Percent Compaction}$						
	No. of Passes	Depth of Lift	Percent Moisture	Lbs/ft <sup>3</sup> Dry	Maximum Density	Percent Compaction	Accept
Observations or Comments							
TEST METHOD USED FOR DEMONSTRATION <input type="checkbox"/> Nuclear Gage (ASTM D2922 & D3017) <input type="checkbox"/> Other _____							
<b>D</b>	Contractor Representative						Date
	Engineer/Constructor Inspector						Date

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## INSTRUCTIONS

This Soil Compaction Procedure form, when approved by the Engineer/Constructor Inspector, documents witnessing and verifying the compaction procedure.

Section A is the responsibility of the Construction Contractor. It is to be completed at the time of backfill compaction demonstration and presented to the Engineer/Constructor Inspector.

Section B is completed by the Engineer/Constructor Inspector. Data entered is obtained from the agency or individual that performed testing.

Section C is completed by the Engineer/Constructor Inspector as the demonstration is performed. Using the applicable formula, the percent compaction achieved is determined and entered. Acceptance is based on the results as compared with the compaction percent required in Section A.

Section D is signed and dated by the Construction Contractor Representative acknowledging responsibility for this procedure and compliance thereto for applicable backfill operations. Section D is signed and dated by the Engineer/Constructor Inspector to signify witnessing and verification.

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## SECTION 02512

### HOT-LAID ASPHALTIC CONCRETE PAVEMENT

#### PART 1 - GENERAL

##### 1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

##### 1.1.1.1 American National Standards Institute (ANSI)

ANSI D6.1-1978, w/Rev.  
through Dec 1983

American National Standard  
Manual on Uniform Traffic Control  
Devices for Streets and Highways

##### 1.1.1.2 Washington State Department of Transportation (WSDOT)

M41-10-88

Standard Specifications for  
Road, Bridge, and Municipal  
Construction

1.2 SUBMITTALS: Refer to Section 01300 for submittal procedures.

1.2.1 Laboratory Reports: Submit laboratory reports for following.

1.2.1.1 Asphalt: Showing that asphalt used in mix meets the requirements of AR-4000W in accordance with WSDOT M41-10, Section 9-02.1(4).

1.2.1.2 Asphalt concrete mix: Showing compliance with WSDOT M41-10, Sections 9-03.8(2) and 9-03.8(6). Include Rice density as established by WSDOT Method 705.

#### PART 2 - PRODUCTS

##### 2.1 MATERIALS

2.1.1 Asphalt: Meeting the requirements of WSDOT M41-10, Sections 9-02.1(2) and 9-02.1(4). Grade of paving asphalt for use in asphaltic concrete mixture shall be AR-4000W.

2.1.2 Aggregate: Class "B" meeting the requirements of WSDOT M41-10, Section 9-03.8(1),(2), (3)B.

2.1.3 Blending Sand: Meeting the requirements of WSDOT M41-10, Section 9-03.8(4).

2.1.4 Mineral Filler: Meeting the requirements of WSDOT M41-10, Section 9-03.8(5).

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2.2 MIXES

2.2.1 Proportioning of Asphalt Concrete Materials: Meeting the requirements of WSDOT M41-10, Section 9-03.8(6) Class "B" asphalt concrete.

PART 3 - EXECUTION

3.1 INSTALLATION

3.1.1 Construction: In accordance with following sections of WSDOT M41-10.

3.1.1.1 Asphalt mixing plants: Section 5-04.3(1).

3.1.1.2 Hauling equipment: Section 5-04.3(2).

3.1.1.3 Asphalt pavers: Section 5-04.3(3).

3.1.1.4 Rollers: Section 5-04.3(4).

3.1.1.5 Existing surface conditioning: Section 5-04.3(5). No prime coat required.

3.1.1.6 Asphalt material heating: Section 5-04.3(6).

3.1.1.7 Aggregate preparation: Section 5-04.3(7).

3.1.1.8 Mixing: Section 5-04.3(8).

3.1.1.9 Spreading and finishing: Section 5-04.3(9).

3.1.1.10 Compaction: Section 5-04.3(10). Control may be performed by the Virginia Breakover Method.

3.1.1.11 Joints: Section 5-04.3(11).

3.1.1.12 Samples: Section 5-04.3(12).

3.1.1.13 Surface smoothness: Section 5-04.3(13).

3.1.1.14 Heating-planing bituminous pavement: Section 5-04.3(14).

3.1.1.15 Weather limitations: Section 5-04.3(16).

3.1.1.16 Asphalt change in grade: Section 5-04.3(18).

3.1.1.17 Driving surface sealing: Section 5-04.3(19).

3.1.2 Pavement Striping: In accordance with ANSI D6.1, Section III and WSDOT M41-10, Section 8-22.

3.2 FIELD QUALITY CONTROL

3.2.1 Sampling and testing of asphalt concrete pavement will be performed by KEH.

END OF SECTION

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SECTION 02650  
PIPED UTILITIES

PART 1 - GENERAL

1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

1.1.1.1 American National Standards Institute (ANSI)

ANSI Z53.1-1979

American National Standard  
Safety Color Code for Marking  
Physical Hazards

1.1.1.2 American Society for Testing and Materials (ASTM)

A 307-88a

Standard Specification for  
Carbon Steel Bolts and Studs,  
60,000 PSI Tensile Strength

A 563-88a

Standard Specification for  
Carbon and Alloy Steel Nuts

D 2321-83a

Standard Practice for Underground  
Installation of Flexible Thermo-  
plastic Sewer Pipe

1.1.1.3 American Water Works Association (AWWA)

C104-85

American National Standard for  
Cement-Mortar Lining for Ductile-  
Iron Pipe and Fittings for Water

C110-87

American National Standard for  
Ductile-Iron and Gray-Iron  
Fittings, 3 in. Through 48 in.,  
for Water and Other Liquids

C111-85

American National Standard for  
Rubber-Gasket Joints for Ductile-  
Iron and Gray-Iron Pressure  
Pipe and Fittings

C600-87

AWWA Standard for Installation  
of Ductile-Iron Water Mains and  
Their Appurtenances

	C651-86	AWWA Standard for Disinfecting Water Mains
	C900-81	AWWA Standard for Polyvinyl Chloride (PVC) Pressure Pipe, 4 in. Through 12 in., for Water
	M23-80	AWWA Manual for PVC Pipe--Design and Installation
1-1-1-4	Factory-Mutual-System-(FM)	
1.1.1.4	1989-Edition	Approval-Guide
1-1-1-5 (IAPMO)	International Association of Plumbing and Mechanical Officials	
1.1.1.5	1988 Edition	Uniform Plumbing Code (UPC)
1-1-1-6	National Fire Protection Association (NFPA)	
	NFPA 24	Standard for the Installation of Private Fire Service Mains and Their Appurtenances, 1987 Edition
1-1-1-7	Underwriters-Laboratory-(UL)	
	1989 --	Fire-Protection-Equipment Directory
1.1.1.6 1-1-1-8	Washington State Department of Transportation (WSDOT)	
	M41-10-88	Standard Specifications for Road, Bridge, and Municipal Construction

ECN-25

ECN-25

1.2 SUBMITTALS: Refer to Section 01300 for submittal procedures.

1.2.1 Approval Data: Submit information listed in Column 5 of Approval Data List in this Section.

1.2.2 Leak/Pressure Test Procedures: Submit procedures outlining proposed methods of testing joints in piping systems.

1.2.3 NFPA Test Certificate: Submit completed Contractor's Material and Test Certificate in accordance with NFPA 24, Section 8-9.3.4.

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 General

2.1.1.1 Components of new underground fire protection system, if not designated in this Section and the Drawings by manufacturer's name and model or figure number, shall be current products of manufacturer ~~and be listed or approved for intended use by UL or FM.~~

ECN-25  
ECN-25

2.1.2 Pipe and Fittings: Meet the requirements of pipe codes in this Section and details on the Drawings.

2.1.3 Valves: Specified in pipe codes and provided with adjustable cast iron valve boxes. ~~UL-listed or FM-approved.~~

ECN-25

2.1.4 Fire Hydrants: See Section 02668.

2.1.5 Hydrant Connection Valve: See Section 02668.

2.1.6 Indicator Posts: See Section 02668.

2.1.7 Reflective Sheeting: 6 inch wide reflective sheeting for placement around fire hydrant body and 3 inch wide sheeting for placement around barricade posts for fire hydrants, Scotchlite No. 3270 silver "Wide-Angle Flat Top", adhesive coated.

2.1.8 Drainage Material for Fire Hydrant Base: Meeting the requirements of WSDOT M41-10, Section 9-03.9(3), base course classification.

2.1.9 Bitumastic: Koppers No. 550 or Superservice Black.

2.1.10 Painting: See Section 09900.

PART 3 - EXECUTION

3.1 INSTALLATION

3.1.1 General

3.1.1.1 Install piping and piping accessories in accordance with the Uniform Plumbing Code (UPC), NFPA 24, the Pipe Codes, the Drawings, and this Section.

3.1.1.2 Keep piping systems clean during work. Once fabrication has started on length of pipe, plug or cap open ends when installation is not in progress to prevent entry of dirt and other foreign material.

3.1.1.3 Where piping is laid in trench, trench shall be free of frost or frozen earth and standing water.

3.1.2 Polyvinyl Chloride (PVC) Pipe

3.1.2.1 Protect from impact shocks and dropping. Before laying, inspect and discard damaged sections. PVC piping shall not be installed in the vertical position.

3.1.2.2 Start laying in finished trenches at lowest point of run and progress upgrade. Support pipe full length of barrel.

3.1.2.3 Handle pipe and accessory materials in accordance with AWWA M23, Chapter 6.

3.1.2.4 Install with alignment and grade in accordance with ASTM D 2321, Section 02200, and the Drawings.

3.1.2.5 Support valve and cast-iron fitting weight on concrete cradle, or concrete blocks with anchors.

3.1.2.6 Provide thrust restraint at tees, plugs, caps, valves, and bends in accordance with NFPA 24, Article 8-6.

a. If concrete thrust blocks are used, size blocks as shown on the Drawings.

b. If tie rods are used, install in accordance with 8-6.2.2 through 8-6.2.6.

3.1.3 Coat carbon steel accessories, which will be buried, such as tie-rods and clamps, with bitumastic. Allow time for bitumastic to dry before backfilling.

3.1.4 Install fire hydrants and hydrant connection valves in accordance with the Drawings and this Section.

3.1.5 Install post barricades around fire hydrants and post indicator valves in accordance with the Drawings and this Section.

3.1.6 Excavation, backfill, and grading work shall meet the requirements of Section 02200 as it applies.

3.1.7 Repair asphaltic concrete pavement removed for installation of piping in accordance with Section 02512.

3.1.8 Place drainage material at base of fire hydrant in accordance with AWWA C600, Section 3.7. Interface between drainage material and compacted earth fill shall be separated by layer of 30 pound roofing paper.

3.1.9 Fire hydrant base pad shall bear on undisturbed or compacted earth and be minimum 24 inch diameter or square by 4 inch thick precast concrete.



3.1.10 Centerline of fire hydrant pumper nozzle shall be between 18 and 22 inches above adjacent finished grade. Orient pumper nozzle toward roadway or street.

### 3.1.11 Painting and Marking

3.1.11.1 Surface preparation, materials, and coating application of primer and paint shall be in accordance with Section 09900, Paragraphs 3.2.1 and 3.5.1.

3.1.11.2 Colors: Defined in ANSI Z53.1.

a. Fire hydrants yellow.

b. Barricade posts red.

3.1.11.3 After painting is completed, place 6 inch wide reflective band around body of fire hydrant immediately below pumper nozzle. Place 3 inch wide reflective bands around fire hydrant barricade posts as shown on the Drawing.

### 3.1.12 Flushing

3.1.12.1 Obtain written method for disposal of flushing water from KEH.

3.1.12.2 After installation, before pressure testing completed system, and-before-connecting-completed-system-into-existing-system, flush piping with water until effluent is clean and contains no visible particulate matter but in no case for less than one minute.

3.1.12.3 Use sanitary water for flushing sanitary water lines.

3.1.12.4 Flush new sanitary water piping in accordance with NFPA 24, Article 8-8.

## 3.2 FIELD QUALITY CONTROL

### 3.2.1 Hydrostatic Testing

3.2.1.1 Furnish instruments, facilities and labor required to conduct tests.

3.2.1.2 Document leak/pressure testing of sanitary waterlines on the NFPA Test Certificate.

3.2.1.3 Perform leak tests in presence of KEH unless otherwise instructed in writing.

3.2.1.4 Perform tests after lines have been flushed and before backfilling.

3.2.1.5 Before applying test pressure to piping, install necessary restraining devices to prevent distortion or displacement of piping.

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3.2.1.6 Install 1 temporary relief valve during pressure testing of systems. Relief valve shall have discharge capacity of at least 125 percent capacity of pressurizing device and be set to operate at not more than 110 percent of test pressure. Demonstrate proper operation of relief valve at following times.

a. Before each series of leak tests before relief valve is attached to system.

b. Whenever KEH has cause to question operating accuracy of relief valve.

3.2.1.7 Verify air has been expelled from piping before applying hydrostatic pressure.

3.2.1.8 Test new Pipe Code A in accordance with NFPA 24 Article 8-9. Leakage at joints shall not exceed limits specified in NFPA 24, Article 8-9. Repair unsatisfactory joints and retest.

3.2.1.9 If lines are subject to freezing, remove water upon completion of hydrostatic test.

### 3.3 DISINFECTION

3.3.1 Disinfect sanitary water lines in accordance with AWWA C651.

3.3.2 Arrange for bacteriological testing of water samples with KEH before performing disinfection procedures. Bacterial analysis is 4 days in length from time samples are received in laboratory. Analysis provides "presumptive" results in 2 days with "confirmation" at end of test.

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# PIPE CODE A

Service:	Maximum Operating Pressure:	Test Pressure:	Maximum Operating Temperature:
Sanitary Water (SW)	120 psig	180 psi	100 F

Sizes	12 inch and larger.
Pipe	PVC in accordance with AWWA C900.
Joints	Elastomeric-gasket couplings in accordance with AWWA C900.
Wall Thickness	Class 200, DR 14.
Fittings	Cast iron or ductile iron in accordance with AWWA C110 with cement lining in accordance with AWWA C104 and mechanical or push-on joints in accordance with AWWA C111.
Tapping Valve	Flanged by MJ ends, Kennedy Fig. 950XP or Mueller #H-667.
Gate Valves	3 inch, flanged, Stockham Fig. G-612. 12 inch, mechanical or push-on joints, Kennedy Fig. 70X or 71X. 8 inch, mechanical or push-on joints, Kennedy Fig. 70X or 71X.
Flexible Couplings	Compression type slip-on steel, Dresser type 38 or 138.
Combination Air Valves	3 inch, APCO #147C.3.
Bolting	Carbon steel heavy hex series bolts, ASTM A 307, Grade B, and heavy hex nuts, ASTM A 563, Grade A.
Gaskets	Use full face gaskets with flat face flanges. Compressed synthetic fiber, 1/16 inch thick, Anchor Packing #443.

ECN-17

[illegible]

SECTION 02668  
FIRE WATER SYSTEMS

PART 1 - GENERAL

1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

1.1.1.1 American National Standards Institute (ANSI)

ANSI Z53.1-1979	American National Standard Safety Color Code for Marking Physical Hazards
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1.1.1.2 American Water Works Association (AWWA)

C104-85	American National Standard for Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water
C110-87	American National Standard for Ductile-Iron and Gray-Iron Fittings, 3 in. Through 48 in., for Water and Other Liquids
C111-85	American National Standard for Rubber-Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings
C151-86	American National Standard for Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds, for Water or Other Liquids
C500-86	AWWA Standard for Gate Valves for Water and Sewerage Systems
C502-85	AWWA Standard for Dry-Barrel Fire Hydrants
C600-87	AWWA Standard for Installation of Ductile-Iron Water Mains and Their Appurtenances

C651-86

AWWA Standard for Disinfecting  
Water Mains

1.1.1.3 Factory Mutual System (FM)

1989 Edition

Approval Guide

1.1.1.4 National Fire Protection Association (NFPA)

NFPA 24

Standard for the Installation  
of Private Fire Service Mains  
and Their Appurtenances,  
1987 Edition

NFPA 1963

Standard for Screw Threads and  
Gaskets for Fire Hose  
Connections, 1985 Edition

1.1.1.5 Underwriters Laboratories, Inc (UL)

1989

Fire Protection Equipment  
Directory

1.1.1.6 Washington State Department of Transportation (WSDOT)

M41-10-88

Standard Specifications for  
Road, Bridge, and Municipal  
Construction

1.2 SUBMITTALS: Refer to Section 01300 for submittal procedures.

1.2.1 Approval Data: Submit information listed in Column 5 of Approval  
Data List in this Section.

1.2.2 Vendor Information: Submit information listed in Column 5 of  
Vendor Information List in this Section.

1.2.3 Design/Installation Drawings: Submit design and installation  
drawings of underground fire mains, including post indicator valves, fire  
hydrants and post barricades.

1.2.4 Record Drawings: Submit drawings of completed underground fire  
mains as installed.

1.2.5 NFPA Test Certificate: Submit completed Contractor's Material and  
Test Certificate in accordance with NFPA 24, Section 8-9.3.4.

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 General

2.1.1.1 Components of new underground fire protection system, if not designated in this Section and the Drawings by manufacturer's name and model or figure number, shall be current products of manufacturer and be listed or approved for intended use by UL or FM.

2.1.1.2 System is designed for maximum operating pressure of 125 psig.

## 2.1.2 Piping

2.1.2.1 Pipe, pipe joints and fittings shall meet the requirements of NFPA 24, the Drawings and this Section.

2.1.2.2 Pipe: Cement lined meeting the requirements of AWWA C104 and ductile iron, Class 50 minimum, meeting the requirements of AWWA C151. Pipe shall have rubber gasketed mechanical joints meeting the requirements of AWWA C111.

2.1.2.3 Fittings: Cement lined meeting the requirements of AWWA C104, with joints and pressure class ratings compatible with pipe used and shall meet the requirements of AWWA C110.

## 2.1.3 Post Indicator Valve (PIV)

2.1.3.1 Gate valve: Nonrising stem valve with indicator post flange. Valve shall open in counterclockwise direction.

2.1.3.2 Indicator post: Adjustable, telescoping barrel type with locking handle and clearly visible, position indicator sign plates, protected by nonbreakable plastic windows. Post shall be matched for assembly to gate valve.

## 2.1.4 Switches

2.1.4.1 Valve Position Supervisory Limit Switches for Installation on OS&Y Gate Valves and Post Indicator Valves: Tamperproof and designed for use intended. Switch shall be operated during first 2 revolutions of handle in closing direction.

2.1.4.2 A low temperature supervisory switch with normally-closed contacts shall be installed in each sprinkler system valve house to annunciate a temperature drop within the valve house below 42 F.

2.1.5 Fire Hydrants: Meeting the requirements of AWWA C502, dry barrel type with compression type main valve which opens against pressure. Inlets shall be 6 inches with minimum 5 inch valve opening. Hydrants shall have one 4-1/2 inch pumper nozzle and two 2-1/2 inch hose nozzles, including caps and chains. Nozzle threads shall be National Standard Fire Hose Coupling Threads in accordance with NFPA 1963. Hydrant operating nut and cap nuts shall be National Standard Pentagon in accordance with AWWA C502 and open in counter-clockwise direction. Stem seals shall be O ring type.

2.1.6 Hydrant Connection Valve: 6 inch gate valve meeting the requirements of AWWA C500 and provided with adjustable cast iron valve box.

2.1.7 Reflective Sheeting: 6 inch wide reflective sheeting for placement around fire hydrant body and 3 inch wide sheeting for placement around barricade posts for fire hydrants, similar to Scotchlite No. 3270 silver "Wide-Angle Flat Top", adhesive coated.

2.1.8 Backflow Prevention Assembly: 10-inch reduced pressure type, supplied with 2 OS&Y gate valves, AMES #4000-RP-OSY or approved equal. Reduced pressure principle backflow prevention assembly must be approved for installation in Washington State by the Washington State Department of Health.

2.1.9 Drainage Material for Fire Hydrant Base: Meeting the requirements of WSDOT M41-10, Section 9-03.9(3), base course classification.

2.1.10 Bitumastic: Similar to Koppers No. 550 or Superservice Black.

2.1.11 Painting: See Section 09900.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

3.1.1 Install piping and piping accessories in accordance with NFPA 24, AWWA C600, the Drawings, and this Section.

3.1.2 Protect pipe and fittings from impact shocks and dropping. Before laying, inspect pipe and discard damaged components. Remove damaged components from job site.

3.1.3 Keep piping systems clean during work. Once fabrication has started on length of pipe, plug or cap open ends of piping when installation is not in progress to prevent entry of dirt and other foreign material. Inner surfaces of pipe, valves, and fittings shall be smooth, clean, and free of sand, debris and dirt when installed.

3.1.4 Where piping is laid in trench, trench shall be free of frost or frozen earth and standing water.

3.1.5 Install new fire mains minimum depth of 3'-6" from grade to top of pipe.

3.1.6 Install restraints on pipe and piping components in accordance with NFPA 24, Article 8-6 and A-8-6.2. Restraining mechanical joints as listed in UL Fire Protection Equipment Directory may be substituted for conventional anchoring. Where thrust blocks are used, make bearing area equal to area shown in Table 8-6.2.9 multiplied by a factor of 1.33 and as shown on the Drawings.

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3.1.7 Coat carbon steel accessories which will be buried, such as tie-rods and clamps, with bitumastic. Allow time for bitumastic to dry before backfilling.

3.1.8 Install fire hydrants and hydrant connection valves in accordance with the Drawings and this Section.

3.1.9 Install post barricades around fire hydrants and post indicator valves in accordance with the Drawings and this Section.

3.1.10 Excavation, backfill and grading work shall meet the requirements of Section 02200 as it applies.

3.1.11 Repair asphaltic concrete pavement, removed for installation of fire water main, in accordance with Section 02512.

3.1.12 Place drainage material at base of fire hydrant in accordance with AWWA C600, Section 3.7. Interface between drainage material and compacted earth fill shall be separated by layer of 30 pound roofing paper.

3.1.13 Fire hydrant base pad shall bear on undisturbed or compacted earth and be minimum 24 inch diameter or square by 4 inch thick precast concrete.

3.1.14 Centerline of fire hydrant pumper nozzle shall be between 18 and 22 inches above adjacent finished grade. Orient pumper nozzle toward roadway or street.

3.1.15 Painting and Marking

3.1.15.1 Surface preparation, materials and coating application of primer and paint shall be in accordance with Section 09900.

3.1.15.2 Colors: Defined in ANSI Z53.1.

a. Fire hydrant yellow.

b. Upper barrel of indicator post red.

c. Barricade posts red.

3.1.15.3 After painting is completed, place 6 inch wide reflective band around body of fire hydrant immediately below pumper nozzle. Place 3 inch wide reflective bands around fire hydrant barricade posts as shown on the Drawing.

3.2 FIELD QUALITY CONTROL

3.2.1 General

3.2.1.1 Furnish equipment and instruments required to perform flushing and testing.

- 9 2 1 2 3 0 6 1 3 6 2
- 3.2.1.2 Perform flushing and testing while witnessed by KEH.
  - 3.2.1.3 Remove and replace or repair apparatus, material, or work which fails in flushing or testing operations and repeat operation.
  - 3.2.1.4 Repair damage resulting from flushing or testing.
  - 3.2.1.5 Installation of backflow prevention assembly shall be inspected and tested by a Washington State certified backflow assembly tester.
  - 3.2.2 Flushing
    - 3.2.2.1 Obtain written procedure for disposal of flushing water from KEH.
    - 3.2.2.2 Flush new piping in accordance with NFPA 24, Article 8-8.
  - 3.2.3 Hydrostatic Testing
    - 3.2.3.1 Perform testing in accordance with NFPA 24, Article 8-9.
    - 3.2.3.2 Perform testing after piping has been flushed and before backfill is placed over pipe joints.
    - 3.2.3.3 Verify that air has been expelled from piping before applying hydrostatic pressure.
    - 3.2.3.4 Examine piping joints, fittings, and other potential leak sources during test. Leaks in piping system are not acceptable. Repair leaks and retest.
    - 3.2.3.5 If piping system is subject to freezing, remove water from lines upon completion of tests.
  - 3.3 DISINFECTING
    - 3.3.1 Disinfect fire water lines in accordance with AWWA C651.
    - 3.3.2 Arrange for bacteriological testing of water samples with KEH before performing disinfection procedures. Bacterial analysis is 4 days in length from time samples are received in laboratory. Analysis provides "presumptive" results in 2 days with "confirmation" at end of test.

W016HC1-SP.1971

02668 - 7

B-016H-C1  
As-Built Rev

Project No <u>W-016H-C1</u> 9 2 Project Title <u>RMW Storage Facility</u> Specification Section <u>02668</u>			1 2 3 6 0 1 3 6 3 <b>APPROVAL DATA LIST</b> ("X" Indicates Required Data)										
1  EPN IDENTIFICATION	2  DESCRIPTION	3  REFERENCE DRAWING	4  SPECIFICATION PARAGRAPH	5  DATA									6  REMARKS
				Dimensional Drawings	Equipment Weights	Specifications	Material Description	Performance Data	Circuit or Control Diagrams	Data Sheets	Illustrative Cuts	Installation Instructions	
1	Pipe		2.1.2				X					X	
2	Fittings		2.1.2.3				X					X	
3	Post Indicator Valve (PIV)		2.1.3									X	
4	Fire Hydrant		2.1.5									X	
5	Hydrant Connection Valve with Valve Box		2.1.6									X	
6	Supervisory Switches		2.1.4									X	X
7	Backflow Prevention Assembly		2.1.8									X	

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02668 - 8  
END OF SECTION

W-016H-C1  
As-Built Rev 1

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SECTION 03300  
CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

1.1.1.1 American Concrete Institute (ACI)

ACI 301-84 (Revised 1988)      Specifications for Structural  
Concrete for Buildings

ACI 306.1-87      Standard Specification for  
Cold Weather Concreting

1.1.1.2 American Society for Testing and Materials (ASTM)

A 615-87a      Standard Specification for  
Deformed and Plain Billet-Steel  
Bars for Concrete Reinforcement

C 33-86      Standard Specification for  
Concrete Aggregates

C 94-89b      Standard Specification for  
Ready-Mixed Concrete

C 150-86      Standard Specification for  
Portland Cement

C 260-86      Standard Specification for  
Air-Entraining Admixtures for  
Concrete

C 494-86      *Standard Specification for  
Chemical Admixtures for Concrete*

C 1017-85      *Standard Specification for  
Chemical Admixtures for Use in  
Producing Flowing Concrete*

ECN-10

ECN-10

1.1.1.3 National Ready Mixed Concrete Association (NRMCA)

January 1, 1976      Certification of Ready Mixed  
(Third Revision)      Concrete Production Facilities

1.2 SUBMITTALS: Refer to Section 01300 for submittal procedures.

1.2.1 Certification of Ready Mixed Concrete Production Facilities:  
Submit current legible copy of "Certificate of Conformance for Concrete  
Production Facilities" issued by and bearing the seal of the National Ready  
Mixed Concrete Association. Certificate shall contain signature and seal of  
registered Civil Engineer.

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1.2.2 Reinforcing Steel Fabricator Drawings: Submit complete reinforcing fabrication and placing drawings based on block diagram in accordance with ACI 301, Section 5.1, including splices not shown on the Drawings.

1.2.3 Block Diagram: Submit block diagram of scheduled concrete pours. Identify pours.

1.2.4 Concrete Materials, Mix Design and Mix Proportions: Submit in accordance with ACI 301, Sections 3.8 and 16.7.3. Define each material to be used in concrete and state amount, by weight, to be utilized per cubic yard of plastic mix.

1.2.5 Cold Weather Concreting: Submit detailed procedure in accordance with ACI 306.1, Section 1.5.1.

1.2.6 Curing Procedure: Submit description of materials and methods of curing in accordance with ACI 301, Section 12.2.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

#### 2.1.1 Concrete

2.1.1.1 Cement: ASTM C 150, Type II (Low Alkali).

2.1.1.2 Aggregates: ASTM C 33, maximum size 3/4 inch.

2.1.1.3 Air-entraining admixture: Meeting the requirements of ASTM C 260; Sika Chemical Company "SIKA AER"; Chem-Masters Corp "Adz-Air"; or Protex Industries "Protex".

2.1.1.4 Properties (*Except as noted otherwise on drawings*)

ECN-23

a. Minimum allowable compressive strength: 4500 5000 psi at 28 days. (3000 psi at 28 days for thrust blocks) (3000 psi @ 28 days for all post and duct banks)

ECN-3

ECN-33

ECN-33

b. Slump: 4 3/4 inch maximum in accordance with ACI 301, Section 3.5.

ECN-22

ECN-22

c. Air content: 5 percent  $\pm$  1.5 percent.

d. Water-cement ratio: 0.50 maximum.

e. Cement: --540-lb/ey-minimum--

ECN-3

f. Proportions: In accordance with ACI 301, Sections 3.8 and 3.9.

ECN-3

2.1.1.5 Mixing: In accordance with ASTM C 94.

2.1.1.6 Delivery: In accordance with ASTM C 94.

2.1.1.7 Superplasticizer: In accordance with ASTM C-494, Type F and ASTM C1017, Type 1 and Type 2.

ECN-  
ECN-10

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2.1.2 Reinforcing Steel

2.1.2.1 Steel bars: ASTM A 615, deformed, Grade 60.

2.1.2.2 Tie wire: Black annealed steel, 16 gage minimum.

2.1.3 Joint Materials

2.1.3.1 Expansion joint filler: See Section 07920.

2.1.3.2 Sealant: See Type II, Section 07920.

2.1.3.3 Waterstop: Polyvinyl chloride (PVC), dumbbell or serrated type, with center bulb, 6 inches wide.

2.1.3.4 Dowel Bars: ASTM A36, carbon steel.

ECN-3

2.1.4 Nonshrink Grout: Nonmetallic type, "Five Star Grout" by US Grout Corp; "Por-Rok" Anchoring Cement by Hallemite; or "Masterflow 713" by Master Builders.

2.1.5 Forms: Wood, steel, plywood, or Masonite Corporation "Concrete Form Presdwood", as required for various specified finishes.

PART 3 - EXECUTION

3.1 PREPARATION

3.1.1 Form Construction

3.1.1.1 Install formwork in accordance with ACI 301, Section 4.2. Interior shape and rigidity shall be such that finished concrete will meet the requirements of the Drawings within tolerances specified in ACI 301, Table 4.3.1.

3.1.1.2 Prepare form surfaces in accordance with ACI 301, Section 4.4.

3.1.1.3 Forms for surfaces which will be permanently concealed from view may be saturated with water before placing concrete instead of other treatment, except in freezing weather forms shall be treated with oil or stearate.

3.1.1.4 Clean forms of foreign material before placing concrete.

3.2 INSTALLATION

3.2.1 Reinforcing Steel

3.2.1.1 Fabricate bars accurately to dimensions shown on Drawings, within tolerances shown in ACI 301, Section 5.6.

3.2.1.2 Tag in accordance with bar list.

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3.2.1.3 Place as shown on approved submittals within tolerances specified in ACI 301, Sections 5.6 and 5.7.

3.2.1.4 Tie to prevent displacement during placement of concrete.

3.2.1.5 Do not force into concrete after initial set has started.

3.2.1.6 Place with dimension of concrete protection equal to ~~min~~ given in ACI 301, Section 5.7, except where shown otherwise on the drawings.

3.2.1.7 Place welded wire fabric on chairs and lap two mesh at ~~ends~~. Tie splices with wire.

3.2.1.8 *At construction joints, grease one end of each dowel to prevent bonding. At any given joint, all dowel bars shall be greased on the same side.*

ECN-3  
|  
ECN-3

3.2.2 Concrete

3.2.2.1 Before ordering, obtain approval of required submittals.

3.2.2.2 Before batching, obtain approval of formwork and reinforcement by KEH.

3.2.2.3 Before placing:

a. Obtain approval of "Pour Slip" by KEH. "Pour Slip" shall include appropriate reference to specific portion of structure to be placed, maximum size of coarse aggregate, design strength, admixture, and ~~slip~~. "Pour Slip" forms can be obtained from KEH.

b. For each truck load, deliver "Trip Ticket" to KEH. "Trip Ticket" shall contain information listed in ASTM C 94, subparagraphs 16.1.1 through 16.1.10, and include water/cement ratio.

3.2.2.4 Place in accordance with ACI 301, Sections 8.1, 8.2, and 8.3. Do not drop (free fall) more than 5 feet. Insert vibrator, vertically if possible, into concrete and reach small distance into concrete in next lower layer. Do not insert vibrators into lower courses that have reached initial set. Take care to avoid allowing head of vibrator to come in contact with forms or embedded items.

3.2.2.5 Temper only as permitted in ACI 301, Section 7.5.

3.2.2.6 Place nonshrink grout where shown on the Drawings and in accordance with manufacturer's recommendations.

3.2.2.7 Weather conditions: Protect concrete during placement in accordance with ACI 301, Section 8.4. Cold weather concreting shall be in accordance with approved procedure.

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3.2.2.8 Construction joints: Make in accordance with ACI 301, Section 6.1, and as detailed on the Drawings. *Sawcut in accordance with ACI 301, Section 11.5 or use embed in accordance with ACI 301, Section 6.4 and 6.5.*

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ECN-3

3.2.2.9 Embedded items: Install in accordance with ACI 301, Sections 6.4 and 6.5.

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3.2.2.10 Expansion joints: Locate as shown on the Drawings and construct with premolded filler and sealant.

3.2.2.11 Contraction joints: Locate as shown on the drawings. Sawcut in accordance with ACI 301, Section 11.5 *or use embed in accordance with ACI 301, Section 6.4 and 6.5.*

3.2.2.12 Placing concrete against earth: Place on or against firm, damp surfaces free of frost, ice and free water. Do not place until required compaction has been obtained. Dampen earth surfaces to receive fresh concrete.

3.2.2.13 Consolidation: Consolidate concrete slabs in accordance with ACI 301, Section 11.6.

### 3.2.3 Concrete Repair and Form Removal

3.2.3.1 Remove forms in accordance with ACI 301, Section 4.5.

3.2.3.2 Cut back form ties and examine concrete surfaces for defects. Repair only after permission for patching is given by KEH.

3.2.3.3 Place concrete repair mortar within 1 hour after mixing. Do not retemper mortar.

3.2.3.4 Surface defect repair: Repair in accordance with ACI 301, Sections 9.1, 9.2 and 9.3. Cure concrete repairs same as new concrete. *The slab within the RMW Storage Building shall be repaired in accordance with Section 09805.*

### 3.2.4 Concrete Finishes and Tolerances

3.2.4.1 Formed surfaces: Start finishing following concrete repair and complete within 96 hours after forms have been removed. Finish in accordance with sections of ACI 301 noted below.

- |   |                |
|---|----------------|
| a. Surfaces exposed to earth backfill             | Section 10.2.1 |
| b. Interior surfaces                              | Section 10.2.2 |
| c. Exterior surfaces exposed to weather           | Section 10.2.2 |
| d. Related unformed surfaces                      | Section 10.5   |
| e. Surfaces to receive special protective coating | Section 10.3.2 |

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3.2.4.2 Unformed surfaces: Finish in accordance with sections of ACI 301 noted below:

- |    |                          |                |
|----|--------------------------|----------------|
| a. | Interior floors          | Section 11.7.3 |
| b. | Exterior equipment slabs | Section 11.7.3 |

9 2 1 2 3 4 5 6 1 3 7 3

c. Exterior slabs subject to  
foot traffic Section 11.7.4

d. Surfaces to receive special  
protective coating Section 11.7.3

### 3.3 FIELD QUALITY CONTROL

3.3.1 Concrete Testing: Sampling and testing of concrete will be the responsibility of KEH. Concrete will be tested to ACI 301, Sections 16.3.4, 16.3.5, 16.3.6 and 16.3.8.

### 3.4 CURING AND PROTECTION

#### 3.4.1 Curing

3.4.1.1 Cure concrete in accordance with ACI 301, Section 12.2. Clear curing compounds shall be tinted or applied surfaces marked to delineate extent of spraying.

3.4.1.2 Do not use curing compound on concrete surfaces to receive special protective coating. Cure in accordance with ACI 301, Section 12.2.1.2 or 12.2.1.5.

#### 3.4.2 Protection

3.4.2.1 Protect concrete during extreme weather conditions in accordance with ACI 301, Section 12.3.

3.4.2.2 Protect concrete from mechanical injury in accordance with ACI 301, Section 12.4.

END OF SECTION

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SECTION 05400  
COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

1.1.1.1 American Iron and Steel Institute (AISI)

1986 Edition

Specification for the Design  
of Cold-Formed Steel Structural  
Members

1.1.1.2 American Society for Testing and Materials (ASTM)

A 446-87

Standard Specification for Steel  
Sheet, Zinc-Coated (Galvanized)  
by the Hot-Dip Process,  
Structural (Physical) Quality

C 955-88

Standard Specification for  
Load-Bearing (Transverse and  
Axial) Steel Studs, Runners  
(Track), and Bracing or  
Bridging, for Screw Application  
of Gypsum Board and Metal  
Plaster Bases

1.1.1.3 Industrial Fasteners Institute (IFI)

IFI-113

Steel Self-Drilling Tapping  
Screws

1.2 SUBMITTALS: Refer to Section 01300 for submittal procedures.

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 Structural Studs and Runners: Meet the requirements of ASTM C 955. Structural properties computed in accordance with AISI Specification.

2.1.1.1 Studs: C-shaped, formed from 0.0635 inch galvanized steel sheet meeting the requirements of ASTM A 446, Grade D, with minimum G 60 coating weight.

2.1.1.2 Runners: U-shaped, formed from 0.0635 inch galvanized steel sheet meeting the requirements of ASTM A 446, Grade A, with G 60 coating weight.

2.1.2 Joists and Stringers: Structural properties computed in accordance with AISI Specification.

2.1.2.1 Joists: C-shaped, formed from 0.0635 inch galvanized steel sheet meeting the requirements of ASTM A 446, Grade D, with minimum G60 coating weight.

2.1.2.2 Stringers: Channel shaped, formed from 0.0635 inch galvanized steel sheet meeting the requirements of ASTM A 446, Grade A, with minimum G60 coating weight.

2.1.3 Screws: Meeting the requirements of IFI-113.

2.1.4 Fasteners and Accessories: Metal framing manufacturer's standard.

## 2.2 FABRICATION

2.2.1 Form members to manufacturer's standard shapes and meet the requirements of AISI Specification.

## PART 3 - EXECUTION

### 3.1 ERECTION

3.1.1 Erect cold-formed metal framing in accordance with manufacturer's instructions.

3.1.2 Align runners accurately and anchor to floor, as shown on the Drawings. Install studs plumb, square and true to line and hold firmly in position with sufficient temporary bracing until permanently fastened in place. Do not splice studs.

3.1.3 Cut right angle connections of framing components to fit squarely against abutting members.

3.1.4 Connect members together and provide bracings in accordance with AISI Specification.

END OF SECTION

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SECTION 05500  
METAL FABRICATIONS

PART 1 - GENERAL

1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

1.1.1.1 American Society of Mechanical Engineers (ASME)

1986 Edition, w/Addenda  
through Dec 1988

ASME Boiler and Pressure Vessel  
Code

Section IX

Qualification Standard for  
Welding and Brazing Procedures,  
Welders, Brazers, and Welding  
and Brazing Operators

1.1.1.2 American Society for Testing and Materials (ASTM)

A 36-88c

Standard Specification for  
Structural Steel

A 53-88a

Standard Specification for Pipe,  
Steel, Black and Hot-Dipped,  
Zinc-Coated Welded and Seamless

1.1.1.3 American Welding Society (AWS)

AWS D1.1-88

Structural Welding Code - Steel

1.1.1.4 Federal Specifications (FS)

RR-G-661E, Including  
AMD 1

Grating, Metal, Bar Type (Floor,  
Except For Naval Vessels)

1.2 SUBMITTALS: Refer to Section 01300 for submittal procedures.

1.2.1 Fabricator Drawings for Gratings

1.2.1.1 Submit drawings showing overall dimensions, details, and direction of bearing bars in accordance with the Drawings. Include cutouts and banding of grating around obstructions.

1.2.1.2 Submit load/deflection tables to verify conformity with design values shown on the Drawings.

### 1.3 QUALITY ASSURANCE

#### 1.3.1 Qualification of Welding Personnel and Procedures

1.3.1.1 Personnel and procedures for welding structural steel shall have been qualified in accordance with AWS D1.1 before welding. Qualification in accordance with ASME Section IX may be substituted for this requirement.

1.3.1.2 Maintain file of welding procedure specifications, procedure qualification records and welder performance qualification test results at site for review.

#### 1.4 DELIVERY, STORAGE, AND HANDLING

1.4.1 Deliver metal fabrications to project at time convenient for installation. If exposed to inclement weather, protect fabrications with paper, plastic or other weatherproof covering and store off ground.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

2.1.1 Rolled Steel Shapes, Plates and Bars: ASTM A 36.

2.1.2 Steel Pipe: ASTM A 53 (black), standard weight, Schedule 40.

2.1.3 Fasteners

2.1.3.1 Expansion anchors: Kwik-Bolt II manufactured by Hilti Fastening Systems.

2.1.3.2 Weld studs: Nelson Stud Welding Company Type H4L.

2.1.4 Metal Grating: Meeting the requirements of FS RR-G-661, Type I, Class 1, Material S, hot-dip galvanized. Grating shall be plain surface type with end banding bars, size shown on the Drawings. Provide manufacturer's standard clips for attachment to framing.

2.1.5 Nonshrink Grout: See Section 03300.

2.1.6 Special Protective Coating: See Section 09805.

### 2.2 FABRICATION

2.2.1 General

2.2.1.1 Verify measurements and take field measurements necessary before fabrication. Provide miscellaneous bolts and anchors, supports, braces and connections necessary for completion of metal fabrications. Cut, reinforce, drill and tap metal fabrications shown to receive finish hardware and similar items. Weld or bolt connections as shown on the Drawings.

2.2.1.2 Workmanship: Form metal fabrications to shape and size, with sharp lines, angles, and true curves. Drilling and punching shall produce clean, true lines and surfaces. Execute and finish work in accordance with fabrication drawings.

2.2.1.3 Jointing and intersections: Accurately made, tightly fitted and in true planes with adequate fastenings.

2.2.1.4 Perform welding of steel connections in accordance with AWS D1.1, using E70XX electrodes. Perform visual weld examination in accordance with AWS D1.1, Paragraph 6.5.5. The Inspector shall examine the work to make certain the requirements of AWS D1.1, Section 3 and Paragraph 8.15 are met.

2.2.2 Miscellaneous Steel Items: Supply required clips, frames, equipment supports, and other fabrications shown on the Drawings. Fabricate parts from standard structural sections or shapes, to sizes required. Wherever miscellaneous parts are exposed, grind edges, corners, and rough cuts smooth and free of snags. Shop paint parts except those to be embedded in concrete or masonry, or those which require other specific finishes.

### 2.2.3 Finishes

2.2.3.1 Prime ferrous metal in accordance with Section 09900. Do not coat members to be embedded in concrete or masonry, surfaces and edges to be field welded, or items to be galvanized.

2.2.3.2 Zinc-rich coating: Galvicon MZP metallic zinc paint or ZRC zinc rich coating.

## PART 3 - EXECUTION

### 3.1 INSPECTION

3.1.1 Examine areas where metal fabrications are to be installed and notify KEH in writing of conditions detrimental to proper and timely completion of work. Do not proceed with work until unsatisfactory conditions have been corrected in manner compatible with requirements for installation. Furnish setting drawings, diagrams, templates, instructions and directions for installation of anchorages, such as concrete inserts, anchor bolts and miscellaneous items having integral anchors, to be embedded in concrete or masonry construction. Coordinate with KEH for delivery of items to site.

### 3.2 INSTALLATION

3.2.1 Install metal fabrications plumb, level or as shown on the Drawings.

3.2.2 Make field connections as neatly as possible with joints flush and smooth. Grind smooth exposed field welds and polish before field painting. Repair welds in galvanized work with 2 coats of zinc-rich coating.

3.2.3 After installation has been approved, clean and paint connections with primer. Touch-up shop prime coat wherever damaged. Repair breaks in galvanized coatings with zinc-rich coating.

END OF SECTION

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## SECTION 07200

### INSULATION

#### PART 1 - GENERAL

##### 1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

##### 1.1.1.1 American Society for Testing and Materials (ASTM)

C 665-86

Standard Specification for  
Mineral-Fiber Blanket Thermal  
Insulation for Light Frame  
Construction and Manufactured  
Housing

##### 1.1.1.2 Underwriters Laboratories, Inc (UL)

1989

Building Materials Directory

1.2 SUBMITTALS: Refer to Section 01300 for submittal procedures.

##### 1.3 DELIVERY, STORAGE, AND HANDLING

1.3.1 Deliver materials to site in original sealed containers or packages bearing manufacturer's name and brand designation. Where materials are covered by referenced specification, containers or packages shall bear specification number, type, and class as applicable.

1.3.2 Store and handle materials in manner to protect from damage during entire construction period.

1.3.3 Store insulation off ground and under cover to protect against weather, moisture, and physical damage.

#### PART 2 - PRODUCTS

##### 2.1 MATERIALS

2.1.1 Blanket Insulation: Mineral fiber insulation meeting the requirements of ASTM C 665. Insulation containing asbestos will not be acceptable. Insulation shall be UL listed and have "flame spread" and "fuel contributed" of 25, and "smoke developed" of 50 or less.

2.1.1.1 Wall insulation: Type III mineral fiber blankets with minimum thermal resistance of R-11 and faced with aluminum foil vapor barrier

covering on 1 side. Insulation shall be capable of fitting into available space without compressing more than 10 percent in thickness.

2.1.1.2 Roof insulation: Type III mineral fiber blankets with minimum thermal resistance of R-19 and faced with asphalted kraft paper aluminum foil vapor barrier covering on 1 side.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

##### 3.1.1 Blanket Insulation

3.1.1.1 Fire riser room: Completely insulate space between framing members or furring strips. Fit snugly into framing spaces leaving no voids. At exterior walls and in roof spaces install with vapor barrier toward interior side of construction. Fasten flanges to metal studs with mechanical fasteners or adhesive recommended by insulation manufacturer. Support insulation installed horizontally with No. 9 wire spaced at 2 feet maximum.

3.1.1.2 Install continuous behind electrical outlets. Fit around electrical conduits, pipes and other protruding objects. When water pipes occur in exterior wall or ceiling construction, apply insulation between pipe and cold side of wall or ceiling.

3.1.1.3 Cut to fit angles, corners, or irregular spaces, forming flange of vapor barrier for fastening to framing. Seal joints or breaks in vapor barrier.

END OF SECTION

## SECTION 07400

### PREFORMED ROOFING AND CLADDING/SIDING

#### PART 1 - GENERAL

1.1 REFERENCED STANDARDS AND SPECIFICATIONS: The following standards and specifications, including documents referenced therein, form a part of this specification to the extent designated herein.

1.1.1 American Society for Testing and Materials (ASTM)

A 446-87

Standard Specification for  
Steel Sheet, Zinc-Coated  
(Galvanized) by the Hot-Dip  
Process, Structural (Physical)  
Quality

A 525-87

Standard Specification for  
General Requirements for Steel  
Sheet, Zinc-Coated (Galvanized)  
by the Hot-Dip Process

1.2 SUBMITTALS: Refer to section 01300 for submittal procedures.

1.2.1 Fabricator Drawings: Submit fabricator erection drawings. Include a description of the sheet materials, fastening devices and sealants to be supplied, the quantity of each type of material, and the layout of each area to be covered with the siding. Details shall show panel capability of meeting exact overall building dimensions and assembly from exterior inward, from inside the building, to avoid assembly interference with nearby buildings, elevated steam lines, and the stack.

1.2.2 Color Samples: Submit manufacturer's standard colors for roof, walls, liners, and trim. Colors used on project will be selected by KEH.

#### 1.3 DELIVERY, STORAGE, AND HANDLING

1.3.1 Apply plastic protection film to preformed surfaces before delivery.

1.3.2 Store materials at site in dry place away from excess moisture, uncured concrete, cement, lime or strong chemicals.

#### PART 2 - PRODUCTS

##### 2.1 METAL ROOFING AND CLADDING/SIDING PANELS

###### 2.1.1 Prefinished Steel

2.1.1.1 Sheet steel stock: ASTM A 446, zinc-coated (galvanized) to ASTM A 525, G90. Factory color finished.

2.1.1.2 Minimum thickness: 0.0217 inch (80,000 psi yield).

2.1.1.3 Roof and walls: Panels shall be 3 foot wide with 4 major corrugations 1-1/2 inches high, 12 inches on center with 2 minor corrugations between each of the major corrugations the entire length of the panel; Butlerib II panels.

2.1.2 See Section 13120 for design loads and criteria.

## 2.2 METAL LINER PANELS

### 2.2.1 Prefinished Steel

2.2.1.1 Panels: ASTM A 446, zinc-coated (galvanized) to ASTM A 525, G60. Factory color finished.

2.2.1.2 Minimum thickness: 0.0187 inch.

2.2.1.3 Walls and ceiling: Nestable corrugated metal liner, 36 inches wide by 9/16 inch deep. Panels shall extend from floor to ceiling and serve as finished ceiling. See Drawings for locations.

a. Provide matching metal trim at interior and exterior corners, and around wall and ceiling openings.

2.2.1.4 Metal wall framing: See Section 05400.

## 2.3 INSULATION: See Section 07200.

## 2.4 METAL TRIM AND ACCESSORIES

2.4.1 Metal closure strips, top, base, head, sill and jamb or corner trims shall be the same material, gage, and finish as the siding.

2.4.2 Eave flashing, trim, ridge caps, ridge channel and similar metal accessories shall be same material, gage and finish as adjacent wall or roof covering.

2.4.3 Gable Trim: 0.0217 inch galvanized steel with factory applied color coating. Design and size shall be Contour Gable Trim by Butler Manufacturing Company.

### 2.4.4 Gutter and Downspout Fabrication

2.4.4.1 Fabricate of same material and finish as wall metal.

2.4.4.2 Form gutters and downspout to collect and remove water flow from roof resulting from rain falling at rate of 3 inches per hour for 5 minute duration.



## 2.5 CLOSURES AND SEALANTS

2.5.1 Closure Strips: Manufacturer's standard, formed compressed rubber, synthetic rubber, bituminous impregnated materials, or metal of same type as roof and wall panels. Closure strips shall be formed to match corrugations of roofing or siding.

2.5.2 Sealant: Nonstaining type, elastomeric, manufacturer's standard.

## 2.6 FASTENERS

2.6.1 Roofing and Siding Panels: Manufacturer's standard type, finished to match adjacent surface when exterior exposed.

2.6.2 Metal Wall Liner and Ceiling Liner: Self-drilling screws, cadmium plated stainless steel, furnished with color coated heads.

## 2.7 FINISH

2.7.1 Precoated enamel on steel with color selected from manufacturer's standards by KEH.

2.7.2 Coating materials containing lead will not be acceptable.

## PART 3 - EXECUTION

### 3.1 METAL ROOFING, SIDING, AND LINER PANELS

3.1.1 Store materials at the project site in a dry place away from excess moisture, uncured concrete, cement, lime, and strong chemicals.

3.1.2 Apply plastic protection film to prefinished surfaces before installation. The plastic shall be removed promptly, either before the panels are installed or immediately after installation.

3.1.3 Exercise care when cutting prefinished material to ensure cuttings do not remain on finish surface.

3.1.4 Fasten cladding system to structural supports, aligned, level and plumb.

3.1.5 Install sealant and gasket to prevent weather penetration.

3.1.6 System: Free of rattles, noise due to thermal movement, and wind whistles.

3.1.7 Attach gutters and downspouts to building. Install gutters to provide drainage.

3.1.8 Anchor doors, including frames and hardware, to supporting construction, install plumb and true, and adjust to provide proper operation.

3.2 METAL TRIM AND CLOSURES

3.2.1 Utilize trim and closures with metal siding installations as shown on fabricator's drawings.

3.2.2 Protect trim with prefinished surfaces from damage in the same manner siding is protected.

3.3 CONNECTORS

3.3.1 Space sheet fasteners in accordance with manufacturer's recommendations.

3.3.2 Install self-tapping hex-head or slotted pan-head screws with power tools.

3.4 INSULATION: Except as otherwise shown on the Drawings or approved, install insulation against covering and between supporting members to present neat appearance. Blanket insulation shall have facing at joints lapped and fastened to provide tight joints.

3.5 WALL LINER: Fasten wall liner into place to present neat appearance.

3.6 FIELD PAINTING: Upon detection, abraded or corroded spots on shop-painted surfaces shall be wire brushed and touched up with same material used for shop coat. Shop-primed ferrous surfaces exposed on outside of building and shop-primed surfaces of doors shall be painted with 2 coats of approved exterior enamel. Factory color finished surfaces shall be touched up as necessary with manufacturer's recommended touch-up paint.

END OF SECTION

SECTION 07600

FLASHING AND SHEET METAL

PART 1 - GENERAL

1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

1.1.1.1 American Society for Testing and Materials (ASTM)

A 527-85

Standard Specification for  
Steel Sheet, Zinc-Coated  
(Galvanized) by the Hot-Dip  
Process, Lock-Forming Quality

B 32-89

Standard Specification for  
Solder Metal

1.2 SUBMITTALS: Refer to Section 01300 for submittal procedures.

1.2.1 Fabricator Drawings: Submit fabrication and erection drawings of sheet metal work. Include half size or full size details of sections.

1.3 DELIVERY, STORAGE, AND HANDLING

1.3.1 Store sheet metal off ground and protected from damage.

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 Sheet Metal: Galvanized sheet steel, coating class G90, meeting the requirements of ASTM A 527, 0.0276 inch minimum.

2.1.2 Solder: 50 percent tin, 50 percent lead meeting the requirements of ASTM B 32.

PART 3 - EXECUTION

3.1 FABRICATION

3.1.1 General

3.1.1.1 Form sheet metal accurately to profiles shown on the Drawings, free of buckles and waves.

3.1.1.2 Hem exposed edges 1/2 inch.

3.1.1.3 Make provision in fabrication for expansion and contraction.

3.1.1.4 Clean and flux metals before soldering. Sweat solder completely through seam width.

3.1.1.5 Neutralize excess flux, as work progresses, with 5 to 10 percent washing soda solution, and rinse thoroughly.

3.1.1.6 Back paint sheet metal with primer in accordance with Section 09900.

### 3.2 INSTALLATION

3.2.1 Verify surfaces to receive sheet metal are clean and smooth and blocking has been installed.

3.2.2 Install sheet metal watertight, without waves, warps, buckles, fastening stresses or distortion.

END OF SECTION

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SECTION 07920  
SEALANTS AND CALKING

PART 1 - GENERAL

1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

1.1.1.1 American Society for Testing and Materials (ASTM)

D 994-71 (1982)

Standard Specification for  
Preformed Expansion Joint Filler  
for Concrete (Bituminous Type)

1.1.1.2 Federal Specifications (FS)

TT-S-00227E,  
Including AMD 3

Sealing Compound: Elastomeric  
Type, Multicomponent (For  
Caulking, Sealing, And Glazing  
In Buildings And Other  
Structures)

TT-S-00230C,  
Including AMD 2

Sealing Compound: Elastomeric  
Type, Single Component (For  
Caulking, Sealing, And Glazing  
In Buildings And Other  
Structures)

1.2 SUBMITTALS: Refer to Section 01300 for submittal procedures.

1.2.1 Manufacturer's Installation Instructions: Include manufacturer's instructions for cleaning, priming, and application of sealants for each material condition of application along with products supplied.

1.3 DELIVERY, STORAGE, AND HANDLING

1.3.1 Deliver materials to jobsite in manufacturer's original containers, unopened and labels intact.

1.3.2 Store and handle materials to prevent inclusion of foreign materials or exposure to temperatures exceeding 90 F.

1.3.3 Discard sealants or components outdated as indicated by shelf life date.

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PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 General: Container labels shall show name of material, date of manufacture, mixing instructions, shelf life, and curing time.

2.1.2 Sealants

2.1.2.1 Exterior building sealant: One component polyurethane: Nonsag type meeting the requirements of FS TT-S-00230, Type II.

2.1.2.2 Interior building and sheet metal sealant: One component polysulfide sealant: Nonsag type meeting requirements of FS TT-S-00230, Type II.

2.1.2.3 Interior concrete joints: Single or multicomponent polyurethane: Nonsag type, gun grade meeting requirements of FS TT-S-00230 or FS TT-S-00227, Type II, Class A such as; UNIFLEX 200 manufactured by United Coatings or 2 component polysulfide such as Thiocalk manufactured by Steelcote. Verify with special protective coating manufacturer that sealant is compatible; see Section 09805.

2.1.3 Primer: Nonstaining type, as recommended by manufacturer of sealant compound for intended service.

2.1.4 Expansion Joint Filler: Watson Bowman & Acme Corporation "W" Series, or bituminous type meeting the requirements of ASTM D 994.

2.1.5 Backer Rod: Closed-cell polyethylene foam rod.

2.1.6 Bond Breaker Tape: Polyethylene tape with pressure sensitive adhesive.

2.1.7 Forming or Damming: Marinite Board, Cera Form Board, or Cerachrome Blanket by Manville.

PART 3 - EXECUTION

3.1 PREPARATION

3.1.1 Clean joints to be sealed of dirt, dust, oil, grease, mortar, and other foreign materials.

3.1.2 Follow recommendations of manufacturer of sealing materials for each condition of application.

3.1.3 Remove loose particles with wire brush. Blow out joints with oil-free and moisture-free compressed air. Remove wax or oil with methyl ethyl ketone or xylol.

3.1.4 Special-protective-coating,--Section-09805,--shall-be-applied  
after-sealant-has-cured.

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## 3.2 INSTALLATION

### 3.2.1 Primer

3.2.1.1 Prime joints when and as recommended by sealant manufacturer for each condition of application.

3.2.1.2 Do not apply primer to concrete until concrete has cured at least 28 days.

### 3.2.2 Back-Up

3.2.2.1 Install backer rod in joints where polysulfide and polyurethane sealant is to be applied. Install with proper tool, in accordance with manufacturer's instructions and to correct depth for sealant shape specified. Where depth of joint is not sufficient for installation of backer rod, use bond-breaker tape to prevent 3 point adhesion.

3.2.2.2 Install bond-breaker tape over expansion joint filler, in joints where polyurethane sealant is to be applied.

3.2.3 Joint Dimensions: Except as recommended otherwise by manufacturer, make depth of sealant joints 1/2 of joint width.

### 3.2.4 Sealant

3.2.4.1 Perform sealing work using specified materials and proper tools in accordance with manufacturer's recommendations for conditions of each application.

3.2.4.2 Use polyurethane sealant in joints of concrete floors and walkways. For other sealant applications, use 1 component polysulfide.

3.2.4.3 Apply polysulfide sealant to sheet metal joints.

3.2.4.4 Apply sealant to clean and dry joints only.

3.2.4.5 Do not apply exterior sealing material when ambient temperature is below 40 F or above 100 F.

3.2.4.6 Apply sealing materials with guns having proper size nozzles and using sufficient pressure to fill spaces and voids solid. Where use of gun is impractical, proper hand tools, as approved, may be used.

3.2.4.7 Tool sealant after installation as required to properly fill joint and produce smooth surface.

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3.2.4.8 Take necessary precautions to prevent contact of sealants with adjacent surfaces. If necessary, apply masking tape in continuous strips in alignment with edge of joint. Remove masking tape after joints have been tooled.

END OF SECTION

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SECTION 08100  
METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

1.1.1.1 American National Standards Institute (ANSI)

A 115 (1982) Steel Door Preparation Standards

A 156.16-1989 American National Standard for  
Auxiliary Hardware

1.1.1.2 American Society for Testing and Materials (ASTM)

A 366-85 Standard Specification for  
Steel, Sheet, Carbon, Cold-Rolled  
Commercial Quality

A 569-85 Standard Specification for  
Steel, Carbon (0.15 Maximum,  
Percent), Hot-Rolled Sheet and  
Strip, Commercial Quality

1.1.1.3 Insulated Steel Door Systems Institute (ISDSI)

102 Installation Standard for  
Insulated Steel Door Systems

1.1.1.4 Steel Door Institute Specification (SDI)

100 Standard Steel Doors and Frames  
Selection and Usage

108 Guide for Standard Steel Doors

1.2 SUBMITTALS: Refer to Section 01300 for submittal procedures.

1.2.1 Fabricator Drawings: Submit Drawings showing size, elevations and location of each door and frame. Include location and details of hardware reinforcement, and frame anchors.

1.3 DELIVERY, STORAGE, AND HANDLING

1.3.1 Deliver to site in undamaged condition.

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1.3.2 Store above ground and under cover.

1.3.3 Clean abraded or rusty areas and touch up with same primer used for shop finish.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

2.1.1 Hollow Metal Doors: Full-flush type doors, 1-3/4 inch thick, with no seams or joints on face, and conform to SDI 100 and SDI 108.

2.1.1.1 See Drawings for types and sizes.

2.1.1.2 Fabricate from 0.0478 inch minimum annealed and leveled ASTM A 366 or ASTM A 569 steel.

2.1.1.3 Doors reinforced with 1 of following.

a. Steel members welded in place with spaces filled with insulation in accordance with ISDSI 102. See Drawings for insulated door locations.

b. Water resistant honeycomb core bonded to both faces.

2.1.1.4 Fabricate with 1/8 inch maximum clearance from frames.

2.1.1.5 Doors prepared for the installation of lockset, bolts, closers, latch sets, strikes, and mortised for template hinges shall comply with the ANSI A 115 series where applicable.

2.1.1.6 Reinforce for hinges with 0.1345 inch minimum steel, for closers with 0.1046 inch minimum steel, and for locks with 0.0747 inch minimum steel. Reinforcement drilled and tapped as required for attachment of hardware.

2.1.1.7 Surface welds ground smooth.

2.1.1.8 Glazing stop on exterior side of doors shall be nonremovable.

### 2.1.2 Pressed Metal Frames

2.1.2.1 See Drawings for profiles and dimensions.

2.1.2.2 Fabricate from 0.0598 inch annealed and leveled ASTM A 366 or ASTM A 569 steel.

2.1.2.3 Corners mitered, welded and ground smooth.

2.1.2.4 Three 0.0478 inch wall anchors and 1 floor anchor for each jamb.

2.1.2.5 Temporary spreader attached to bottom of each frame.

2.1.2.6 Reinforce for hinges with 0.1345 inch minimum steel, and for strikes and closers with 0.1046 inch minimum steel. Reinforcement drilled and tapped as required for attachment of hardware.

2.1.2.7 Door Silencers: Furnish 3 rubber door silencers for door frames, L03011 in accordance with ANSI A 156.16.

2.1.3 Shop Finish: Doors and frames bonderized and painted with 1 coat of manufacturer's standard, baked-on, rust inhibitive primer. Primer containing lead will not be acceptable.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

3.1.1 Leave temporary spreaders in place until frames are attached to wall framing.

3.1.2 Install frames with jambs plumb and head level.

3.1.3 Install frames for glazed openings where scheduled.

3.1.4 Attach frames to wall framing. Align anchors with hinges and door strike.

3.1.5 Install doors in conjunction with application of hardware, and with uniform clearance at head and jambs. Leave in smooth operating condition.

END OF SECTION

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SECTION 08332  
OVERHEAD COILING DOORS

PART 1 - GENERAL

1.1 REFERENCES

1.1.1 Referenced Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

1.1.1.1 American Society for Testing and Materials (ASTM)

A 526-85

Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Commercial Quality

1.2 SUBMITTALS: Refer to Section 01300 for submittal procedures.

1.2.1 Fabricator Drawings: Submit drawings showing each type and location of doors. Describe features of construction and show installation details.

1.3 DELIVERY, STORAGE, AND HANDLING

1.3.1 Deliver to site in undamaged condition.

1.3.2 Store above ground and under cover.

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 Overhead Coiling Doors: SFN1 manufactured by Overhead Door Corporation.

2.1.1.1 Doors electric power operated (208V, 3 phase, 60 Hz) with auxiliary chain-gear operation. Interlock shall prevent motor operation when chain hoist is engaged.

2.1.1.2 Size doors, including components, to resist wind load of 20 psf. Minimum size of components given in manufacturer's published specifications.

2.1.1.3 Form curtain of interlocking steel flat-faced slats. Form slats from copper bearing steel sheets, galvanize in accordance with ASTM A 526, 1.25 ounce zinc per square foot, and phosphatize.

a. Slats: Type F-265 flat crown, pitch 2-5/8 inches, depth of crown 5/8 inch (minimum 0.0336 inch).

2.1.1.4 Bottom of curtain shall consist of 2 rolled steel angles fastened, back to back, to slats. Equip bottom with safety edge of continuous rubber seal, providing automatic emergency reversing of travel if object in doorway is contacted by safety edge.

2.1.1.5 Door curtain shall coil onto 4 inch minimum steel pipe designed for not more than 0.03 inch deflection per foot of door width. Support pipe on ball bearings and equip with adjustable, counterbalancing, helical springs.

2.1.1.6 Equip guides with double weatherstripping.

2.1.1.7 Cover coiled door with hood formed from 0.0276 inch minimum steel sheet, galvanized in accordance with ASTM A 526.

a. Hood shall be supplied with internal, neoprene baffle and lintel weatherseal to retard air infiltration.

2.1.1.8 Give metal surfaces 1 coat of manufacturer's standard, rust-inhibiting primer.

2.1.1.9 Equip doors with locking devices, suitable for padlocking.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

3.1.1 Install in accordance with the Drawings and approved submittals.

3.1.2 Attach door securely to structure.

3.1.3 At completion, adjust as required for door to operate freely.

END OF SECTION



SECTION 08710  
FINISH HARDWARE

PART 1 - GENERAL

1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

1.1.1.1 American National Standards Institute (ANSI)

ANSI A156.1-1981	American National Standard for Butts and Hinges
ANSI A156.2-1983	American National Standard for Bored and Preassembled Locks and Latches
ANSI A156.4-1980	American National Standard for Door Controls--Closers
ANSI A156.16-1989	American National Standard for Auxiliary Hardware
ANSI A156.18-1984	American National Standard for Materials and Finishes

1.2 SUBMITTALS: Refer to Section 01300 for submittal procedures.

1.2.1 Hardware List: Submit complete hardware list. List hardware for each door separately under door number and hardware requirement.

1.3 DELIVERY, STORAGE, AND HANDLING

1.3.1 Packing and Marking: Pack each item of hardware separately, with necessary fasteners and instructions. Mark each item with hardware number shown in hardware list.

1.3.2 Protect hardware from damage before, during, and after installation.

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 Specific Requirements: See hardware schedule at end of this Section.

2.1.2 Manufacturers' Catalog Numbers: Catalog numbers in hardware schedule refer to following manufacturers.

2.1.2.1 Door hinges: ANSI A156.1, types and sizes shown in schedule, with nonremovable pins on exterior doors; Stanley.

2.1.2.2 Locksets and latchsets: ANSI A156.2, Series 4000, Grade 1, type shown in schedule; ~~Corbin~~.

2.1.2.3 Door closers: ANSI A156.4, type and size shown in schedule; Corbin.

2.1.2.4 Auxiliary hardware: ANSI A156.16, type shown in schedule; Builders Brass Works Corp.

2.1.2.5 Weatherstripping, door bottoms and thresholds: Pemko.

2.1.2.6 Lock-cylinders

a. Furnish 6 pin tumbler cylinders with Corbin 59-6 keyway for each lockset. Key locks to match existing master-key system as directed by KEH.

b. Furnish each lock cylinder with 2 keys.

2.1.3 Fasteners: Furnish necessary screws, bolts, and other fasteners of suitable size and type to anchor hardware in position. Match hardware finish. Furnish with expansion shields, toggle bolts, and other appropriate anchors.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

3.1.1 Verify installation and be responsible for fit of hardware in locations specified.

#### 3.2 ADJUSTING AND CLEANING

3.2.1 Remove protective coverings and clean hardware before completion of project. Leave hardware in smooth operating condition. Deliver keys to KEH.

### 3.3 HARDWARE SCHEDULE

Hardware Group No.	Hardware	Quantity	Hardware Type	ANSI A156.18 Finish	
Group #1	Hinges	1-1/2 Pr	Butts, FBB 168 4-1/2 x 4-1/2	652	
	Lockset	1	863-451 Schlage Heavy Duty D-53 PD 70 Ply 626 (without core)	626	ECN-16
	Closer	1	K120	SBL	ECN-16
	Threshold	1	123-A-36" 172 A 36"	---	ECN-40 ECN-40
	Automatic Door Bottom	1	430ACR 36"	---	ECN-40
	Weatherstripping	1 Set	379AR	---	
	Door Stop	1	F-121 X	626	
Group #2	Hinges	1-1/2 Pr	Butts, FBB 168, 4-1/2 x 4-1/2	652	
	Closer	1	K120	SBL	
	Lockset	1	863-410 Schlage Heavy Duty D-53 PD 70 Ply 626 (without core)	626	ECN-16 ECN-16
	Threshold	1	172A 36"	---	
	Weatherstripping	1 set	379AR	---	
	Door Stop	1	F-121 X	626	
	Automatic Door Bottom	1	430ACR 36"	---	ECN-40

3.4 FIELD QUALITY CONTROL: Notify KEH in accordance with Section 01400.

END OF SECTION

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## SECTION 08800

### GLAZING

#### PART 1 - GENERAL

##### 1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

##### 1.1.1.1 American Society for Testing and Materials (ASTM)

C 1048-88                      Standard Specification for  
Heat-Treated Flat Glass--Kind  
HS, Kind FT Coated and Uncoated  
Glass

##### 1.1.1.2 Consumer Product Safety Commission (CPSC)

Code of Federal Regulations  
Title 16, Commercial Practices  
Chapter II, Consumer Products Safety Commission

Part 1201                      Safety Standards for  
Architectural Glazing Materials

##### 1.1.1.3 Federal Specifications (FS)

TT-S-00230C,                      Sealing Compound: Elastomeric  
Including AMD 2                      Type, Single Component (For  
Calking, Sealing, And Glazing  
In Buildings And Other  
Structures)

##### 1.1.1.4 International Conference of Building Officials (ICBO)

1988 Edition                      Uniform Building Code (UBC)

1.2 SUBMITTALS: Refer to Section 01300 for submittal procedures.

#### PART 2 - PRODUCTS

##### 2.1 MATERIALS

##### 2.1.1 Glass

2.1.1.1 Tempered: Label to show compliance with CPSC Part 1201, Category I or Category II.

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a. Clear tempered: Float meeting the requirements of ASTM C 1048, Kind FT, Condition A, Type I, Class 1.

## 2.1.2 Glazing

2.1.2.1 Setting blocks: 80 durometer neoprene equal to thickness of glass and long enough to limit load on each block to 15 psi. Minimum length of setting blocks, 3 inches.

2.1.2.2 Gasket: Preformed elastomeric material molded or extruded in form of strips, channels or other shapes designed to provide 4 to 10 pounds per linear inch of sealing pressure and possessing following properties.

Tensile strength	2000 psi, min
Elongation at rupture	175%, min
Tear resistance	120 lb/lin in., min
Hardness, Durometer (Shore A scale)	75 $\pm$ 5
Compression set	35%, max 22 hrs at 212 F
Brittleness temperature	-40 F, min

a. Use 40 pound density closed-cell neoprene sponge gasket in combination with full-density wedge gasket meeting the requirements of above material for dry set glazing on metal channel frames.

2.1.2.3 Sealant: One part silicone construction sealant meeting the requirements of FS TT-S-00230.

2.1.2.4 Tape: Preformed sealant, usually butyl-polyisobutylene, with or without shims or spacers, designed for use in compression glazing in conjunction with bulk sealant and gaskets and possessing properties of sealant.

2.1.2.5 Color of tape and sealant shall match color of frame.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

3.1.1 Select glass thickness in accordance with Table No. 54-A as modified by Table No. 54-B, Chapter 54, Glass and Glazing, Uniform Building Code.

3.1.2 Install glass in accordance with the Drawings, approved submittals, and CPSC Part 1201, Chapter II.

3.1.3 Install tempered glass with tong marks at bottom of lite.

3.2 ADJUSTING AND CLEANING

3.2.1 At completion of work, remove glazing compound from window assembly, remove labels and paint from glass, then clean and polish glass.

END OF SECTION

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## SECTION 09805

### SPECIAL PROTECTIVE COATING

#### PART 1 - GENERAL

##### 1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

##### 1.1.1.1 American Society for Testing and Materials (ASTM)

D 4259-88 Standard Practice for Abrading Concrete

D 4260-88 Standard Practice for Acid Etching Concrete

##### 1.2 SUBMITTALS: Refer to Section 01300 for submittal procedures.

1.2.1 List of Materials: Submit complete list of materials, colors and location to be used, to substantiate compliance with the Drawings and this Section. List shall enumerate percentage of volatile and nonvolatile materials and percentage of component parts of each type of material.

1.2.2 Certificate of Compatibility: Submit letter stating that coatings are compatible with polyurethane sealants, both existing and as listed in Section 07920, over which they will be applied.

##### 1.3 DELIVERY, STORAGE, AND HANDLING

1.3.1 Deliver materials to site in manufacturer's unopened containers with labels intact. Do not open containers or remove labels until after inspection and acceptance by KEH.

1.3.2 Store materials in accordance with manufacturer's recommendations and in well ventilated area not exposed to excessive heat, sparks, flame or direct rays of sun.

##### 1.4 PROJECT CONDITIONS

1.4.1 Environment for Coating: Coat interior surfaces only when ambient and surface temperatures are above 50 F.

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 Coating materials are products of Protective Coatings Division of Ameron, Brea, California, Maintenance & Marine Coatings Department of the Valspar Corporation, Azusa, California, or approved equal. Coating materials containing asbestos will not be accepted. *Primer and finish coating materials shall be products of the same manufacturer.*

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ECN-6

2.1.2 Surface Conditioner: Two component epoxy resin, graded silica filler; 82 pounds/cubic foot minimum density, 3000 psi bond strength, 3000 psi tensile strength, shrinkage 15 percent or less, 10,800 psi minimum compressive strength, 0.5 percent absorption, color: off-white.  
Products: NU-KLAD 114 as manufactured by Ameron.

2.1.3 Primer: Self-priming-high-solids-epoxy-or-urethane-coating,-low sheen-to-semigloss-finish,-dark-tan-color,-50-percent-solids-minimum,-dry time-18-hours-or-less-at-50-F.- Products: Amerlock 400 wc as manufactured by Ameron or Hi-Build Epoxy, 78 Series, as manufactured by Valspar. *Epo-Lux 121 as manufactured by Steelcote.*

ECN-35

ECN-35

2.1.4 Finish Coat: Self-priming-high-build-aliphatic-polyurethane enamel,-high-or-semigloss-finish,-light-tan-color,-50-percent-solids-minimum,-dry-time-24-hours-(accelerated)-or-less-at-50-F;-or-50-percent-solids minimum,-semigloss-epoxy-resin,-white-color,-dry-time-16-hours-or-less-at 75-F. Products: Amershield as manufactured by Ameron or Hi-Build Epoxy, 78 Series, as manufactured by Valspar, *Colortop as manufactured by Steelcote.*

ECN-6

ECN-6  
ECN-6

PART 3 - EXECUTION

3.1 INSPECTION

3.1.1 Examine surfaces scheduled to receive coating for conditions that will adversely affect execution, permanence or quality of work and which cannot be put into acceptable condition through preparatory work included in Article 3.2.

3.1.2 Report in writing to KEH conditions that may potentially affect proper application of finish. Do not commence surface preparation or coating application until defects have been corrected and conditions are made suitable.

3.2 PREPARATION

3.2.1 General: Before application, sweep and dust space or area to receive coating.

3.2.2 Pre-Priming: Clean concrete surfaces of laitance, oil, stains, dust, and other foreign material.

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3.2.2.1 Where laitance has not been removed, clean concrete with uniform application of 1 of following.

- a. Abrasive blast in accordance with ASTM D 4259.
- b. Acid etch in accordance with ASTM D 4260.

3.2.2.2 If acid etch is used, rinse thoroughly with clean water when solution ceases to foam and scrub with stiff bristle brush. Allow treated area to thoroughly dry. Scratches, cracks, holes, and abrasions shall be cut back to proper key and filled with Nu-Klad 114.

3.2.2.3 Use abrasive blast wherever concrete surface is visibly spalled or is flaking, based on the judgement of the KEH inspector. Repair voids, after application of primer/sealer, using Wall-Nu Trowelable as manufactured by Steelcote.

3.2.2.34 Allow concrete to cure 30 days before coating is applied, except coating may be applied after concrete has cured 21 days if moisture content of concrete is less than 1210 percent.

ECN-35

ECN-35

### 3.2.3 Post Priming

3.2.3.1 Feather abrasions, chips, skips and holidays occurring in prime coat by sanding and recoat with material and color to minimum dry film thickness specified.

3.2.3.2 Previously coated surfaces shall be recoated only after existing film is completely dry.

3.2.3.3 Protect coating from rain until dry to touch.

### 3.2.4 Protection

3.2.4.1 Provide and install drop cloths, shields and other protective devices required to protect surfaces adjacent to areas being coated. Keep spatter, smears, droppings and over-run of coating materials to minimum and remove as coating work progresses.

3.2.4.2 Remove and store electrical fixtures, outlets and switch plates, mechanical diffusers, escutcheons, surface hardware, fittings and fastenings before starting work. Clean and reinstall upon completion of work in each area. Use no solvent or abrasives to clean hardware that will remove lacquer finish normally used on some items.

## 3.3 APPLICATION

3.3.1 Apply coating materials in accordance with manufacturer's recommendations.

3.3.2 Apply with equipment recommended by manufacturer.

3.3.3 Identify each coat of opaque material by its relation to color of finish coat. Prime coat shall be darkest tint of specified color with each succeeding coat lighter, up to finish coat, which shall be color, tint and sheen specified. Tints of identical coats of identical color and material shall not vary.

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### 3.4 FIELD QUALITY CONTROL

3.4.1 Inspection: KEH will perform tests to ascertain that coating materials have been applied in accordance with this Section.

### 3.5 CLEANING

3.5.1 Furnish and maintain at site, closed metal containers for disposal of waste materials. Place materials spotted or soaked with paint, oil or solvents in containers.

3.5.2 Brushes, rollers, spatulas and spray equipment shall be thoroughly cleaned after each use and shall contain no oils, thinners or other residue after such cleaning.

3.5.3 Remove empty cans from site at end of each shift.

3.5.4 At completion of coating work, remove materials, containers, rags, cloths, brushes, and other equipment from site. Clean up spills.

### 3.6 COATING SCHEDULE

	<u>Minimum Wet Film Thickness</u>	<u>Minimum Dry Film Thickness</u>	
3.6.1 Concrete (Interior of Building 2403WA)			
Prime Coats:			
Epo-Lux 121	NA	NA	ECN-35
Hi-Build (78 Series)	7 mils	5 mils	
Amerlock 400 wc	6.4 mils	5 mils	
Finish Coats:			
Colortop	10 mils	10 mils	ECN-35
Hi-Build (78 Series)	7 mils	5 mils	ECN-44
Amershield	7 mils	5 mils	
3.6.2 Where coating thickness can not be verified, a visual inspection of the surface shall be performed to verify complete coverage.			ECN-35 ECN-35

END OF SECTION

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## SECTION 09900

### PAINTING

#### PART 1 - GENERAL

##### 1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

##### 1.1.1.1 American Society for Testing and Materials (ASTM)

D 16-84 Standard Definitions of Terms  
Relating to Paint, Varnish,  
Lacquer, and Related Products

##### 1.1.1.2 Federal Specifications (FS)

SS-S-1996 Sealer, Water And Weather  
Resistant, For Asphalt, Concrete,  
And Masonry Surfaces

TT-E-489H Enamel, Alkyd, Gloss, Low VOC  
Content

TT-E-509C Enamel, Odorless, Alkyd,  
Interior, Semigloss, White  
And Tints

TT-P-641G,  
Including AMD 1 Primer Coating; Zinc  
Dust-Zinc Oxide (For Galvanized  
Surfaces)

TT-P-645A Primer, Paint, Zinc Chromate,  
Alkyd Type

##### 1.1.1.3 Federal Standard (FED STD)

FED-STD-595A, Including  
CHGS NOT 1, 2, 3, 4, 5, 6,  
7, 8 And 9 Colors

##### 1.1.1.4 Military Specification (MS)

DOD-P-15328D,  
Including AMD 1 Primer (Wash), Pretreatment  
(Formula No. 117 For Metals)

1.1.1.5 Steel Structures Painting Council (SSPC)

Surface Preparation Specifications

SSPC-SP 1-82	No. 1 Solvent Cleaning
SSPC-SP 2-82	No. 2 Hand Tool Cleaning
SSPC-SP 3-82	No. 3 Power Tool Cleaning
SSPC-Paint 27-82	Basic Zinc Chromate-Vinyl Butyral Wash Primer

1.2 SUBMITTALS: Refer to Section 01300 for submittal procedures.

1.2.1 List of Materials: Submit list including manufacturer's names, specifications and other data necessary to show compliance with requirements.

1.2.2 Color Samples: Colors will be selected by KEH. Submit samples in form of 3 inch by 5 inch color chips. Describe coating material and color identification on reverse face of each chip. Retain approved samples for use as quality standard of final finishes.

1.3 DELIVERY, STORAGE, AND HANDLING

1.3.1 Deliver materials to jobsite in sealed, original, labeled containers each bearing manufacturer's name, type of paint, brand name, color designation, and instructions for mixing and reducing.

1.3.2 Store materials at minimum ambient temperature of 45 F in well ventilated and heated area or areas.

1.3.3 Take precautions to prevent fire hazards and spontaneous combustion.

1.4 PROJECT CONDITIONS

1.4.1 Environmental Requirements

1.4.1.1 Temperature

a. Unless otherwise recommended by paint manufacturer, apply coatings when ambient and surface temperatures are between 45 F and 95 F except water-thinned paints and other special coatings. Apply water-thinned paints when ambient and surface temperature is between 50 F and 90 F.

b. Should temporary heat be required, provide until specified surface and air temperatures exist for required time period. Maintain temporary heat for 24 hours after paint and finish application.



1.4.1.2 Weather

- a. Do no exterior work on unprotected surfaces if it is raining or moisture from other source is present or expected before applied paints can dry or attain proper cure without damage.
- b. Allow wet surfaces to dry and attain required temperatures and conditions specified before proceeding with work or continuation of previously started work.
- c. Do not apply finish in areas where dust is being generated.

1.4.1.3 Ventilation: Provide adequate continuous ventilation required for drying various materials as recommended by paint manufacturer.

1.4.1.4 Illumination: Do not proceed with work unless minimum lighting level of 15 footcandles is provided on surfaces to be painted or finished. Provide temporary lighting to attain lighting level specified.

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 Terms used are defined in ASTM D 16.

2.1.2 Sealers

2.1.2.1 Concrete floor, interior, Building 2403WA: Refer to Section 09805.

2.1.2.2 Exterior concrete ramps, backflow preventer building floor, and fire riser room floor, clear: FS SS-S-1996.

2.1.3 Pretreatment Wash for Metals: MS DOD-P-15328.

2.1.4 Primers

2.1.4.1 Zinc chromate: FS TT-P-645, (alkyd type). Tint with lamp black to produce color other than yellow.

2.1.4.2 Zinc dust-zinc oxide: FS TT-P-641, Type II.

2.1.5 Paints

2.1.5.1 Gloss enamel, exterior and interior: FS TT-E-489, Class A.

2.1.5.2 Semigloss enamel, interior: FS TT-E-509.

2.1.6 Other Materials: Materials not specifically described but required to achieve specified finishes shall be of high quality and of manufacture approved by KEH.

2.1.7 Hazardous Material Restrictions

2.1.7.1 Lead: Do not use paint that contains more than 0.06 percent lead by weight in total nonvolatile content of paint.

2.1.7.2 Mercury: Do not use mercurial fungicides in exterior oil paints.

2.1.8 Colors and Tints: Paint manufacturer's standard colors and tints.

PART 3 - EXECUTION

3.1 INSPECTION

3.1.1 Examine surfaces scheduled to receive paint and finishes for conditions that will adversely affect execution, permanence, or quality of work and which cannot be put into acceptable condition through preparatory work included in Article 3.2.1.

3.1.2 Report in writing to KEH conditions that may potentially affect proper application of finish. Do not commence surface preparation or coating application until defects have been corrected and conditions are made suitable.

3.2 PREPARATION

3.2.1 New Surfaces

3.2.1.1 Surfaces to be coated shall be in proper condition to accept and assure proper adhesion of coating system.

3.2.1.2 Ferrous metals

a. For shop primed surfaces, apply phosphoric acid etch solution at field welded or abraded spots and let set for time recommended by acid etch manufacturer, rinse with potable water, and when dry, apply prime coat. Wash primed surfaces free of dirt, oil, and grease.

b. Prepare ferrous metals in accordance with SSPC-SP 2 Hand Tool Cleaning and/or SSPC-SP 3 Power Tool Cleaning. Mill scale may be present on cleaned surface providing it is fully anchored, gives metallic appearance and does not cover more than 30 percent of surface. Prime ferrous metals within four hours after preparation.

3.2.1.3 Galvanized and nonferrous metals: Solvent clean in accordance with SSPC-SP 1 and treat with vinyl type wash coat meeting the requirements of SSPC-Paint 27.

#### 3.2.1.4 Concrete Floors

a. Allow at least 14 days after forms are removed before starting work unless otherwise approved by KEH. Remove dirt, scale, powder, laitance, oil and grease, by washing with trisodium phosphate solution, rinse with potable water and let dry.

b. Verify exact type and manufacture of form oil or release agents used and remove in accordance with written recommendation of manufacturer. Where pH alkalinity reading is above 8-1/2, use zinc sulphate.

c. Remove contamination, dirt, dust, and foreign matter on concrete floors. Apply acid etch solution, rinse with clear water, then let dry. After surface treatment, keep traffic off surface until painted.

#### 3.2.2 Mixing and Thinning

3.2.2.1 General: Packaged paint may be thinned before application where necessary to suit conditions of surface, temperature, weather, and method of application. Follow manufacturer's written instructions for thinning packaged paint. Use of thinner shall not relieve Contractor from obtaining complete hiding. Do not mix paints of different manufacturers.

3.2.2.2 Pretreatment wash: Mix by adding one volume of acid component to four volumes of resin component. Add acid component slowly to resin component with constant stirring. Use within eight hours. Material may be reduced with normal butyl alcohol or 99 percent isopropyl alcohol if thinning is required to maintain wet spray.

#### 3.2.3 Protection

3.2.3.1 Cover or otherwise protect finished work of other trades, surfaces not to be painted, or surfaces not concurrently being painted.

3.2.3.2 Provide sufficient drop cloths, shields, and protective equipment to prevent spray or drippings from fouling surfaces not being painted, including surfaces in paint storage and preparation areas.

3.2.3.3 Place cotton waste, cloths, and materials which may constitute fire hazard in closed metal containers and remove daily from jobsite.

3.2.3.4 Where toxic materials, and both toxic and explosive solvents are used, take appropriate precautions in accordance with manufacturer's written instructions and applicable safety regulatory agencies. In applying acid etch coating or solutions to metals, concrete, plaster, and toxic materials to copper, provide ventilation and take protective measures to meet requirements of safety regulatory agencies.

#### 3.3 APPLICATION

3.3.1 Surfaces to be Painted and Finished: Paint surfaces scheduled or shown. Finish factory-primed materials in accordance with this Section.

3.3.2 General: Paint may be applied by brush, roller, or spray unless otherwise specified. At time of application, paint shall show no signs of deterioration. Maintain uniform suspension of pigments during application.

3.3.2.1 Apply paint so finished surfaces are free of runs, drops, ridges, waves, laps, brush marks, and variations in color, texture, and finish. Hiding shall be complete. Apply each coat as film of uniform thickness. Use rollers of type designed for coating to be applied and surface to be coated. Ensure that surfaces including edges, corners, crevices, welds, and rivets receive film thickness equivalent to adjacent painted surfaces.

3.3.2.2 Touch up suction spots or make overall application of primer or sealer on first coat on gypsum wallboard and other surfaces to produce uniform color and gloss.

3.3.2.3 Touch up concrete sealer coats to eliminate dull spots. Wipe off excess sealer after each application.

3.3.3 Coating Progress: Allow time between successive coats to permit proper drying. Modify drying times to suit abnormal environmental conditions. Oil base or oleoresinous solvent type paints are ready for recoating when paint feels firm, does not deform or feel sticky under moderate pressure of thumb, and application of another coat of paint does not cause lifting or loss of adhesion of undercoat.

3.3.4 Time Between Surface Preparation and Painting: Apply first coat on surfaces that have been cleaned, pretreated, and otherwise prepared for painting as soon as practicable after such pretreatment has been completed, but before deterioration of prepared surface.

3.3.5 Pretreatment Wash Coat: Apply vinyl type wash coat by brush or spray. Maintain wet spray at all times.

#### 3.4 CLEANING

3.4.1 At completion of each day, remove painting materials, empty containers, rags, cloths, brushes, or other equipment. Store or dispose of as appropriate.

3.4.2 As work proceeds and upon completion, promptly remove paint where spilled, splashed, or spattered.

3.4.3 At conclusion of work, leave premises neat and clean to satisfaction of KEH.

### 3.5 PAINTING AND FINISH SCHEDULE

#### Minimum Dry Film

#### 3.5.1 Exterior and Interior

3.5.1.1 Ferrous Metal, Enamel, Gloss  
Pretreatment: MS DOD-P-15328 0.5 mil  
Prime Coat: FS TT-P-645 1.5 mils  
2nd Coat: FS TT-E-489, Class A 1.5 mils  
Finish: FS TT-E-489, Class A 1.5 mils

3.5.1.2 Galvanized Metal, Enamel, Gloss  
Pretreatment: MS DOD-P-15328 0.5 mil  
Prime Coat: FS TT-P-641, Type II 1.5 mils  
2nd Coat: FS TT-E-489, Class A 1.5 mils  
Finish: FS TT-E-489, Class A 1.5 mils

3.5.1.3 Overhead Coiling and Metal Doors  
See Paragraph 3.5.2.2 (Interior)

#### 3.5.2 Interior

3.5.2.1 Ferrous Metal, Enamel, Semigloss  
Pretreatment: MS DOD-P-15328 0.5 mil  
Prime Coat: FS TT-P-645 1.5 mils  
2nd Coat: FS TT-E-509 1.5 mils  
Finish: FS TT-E-509 1.5 mils

NOTE: Preprimed pre-engineered building steel bents shall be touched up only - no finish coats shall be required.

3.5.2.2 Metal Doors and Frames and Overhead Coiling Doors, Enamel, Semigloss  
Prime Coat: By Door Manufacturer 1.5 mils  
2nd Coat: FS TT-E-509 1.5 mils  
Finish: FS TT-E-509 1.5 mils  
(Interior and Exterior)

3.5.3 Use products of same manufacturer within coating system.

#### 3.6 COLOR SCHEDULE: Colors shall be as follows:

3.6.1 Barricade Posts: Safety yellow, PPG No. 23-780 or red No. 21105 in accordance with FED-STD-595. See Drawings for locations.

3.6.2 Miscellaneous Steel Framing: Match prime coat to existing primed components of metal building.

3.6.3 Hollow Metal Doors and Frames: Products of PPG.

3.6.3.1 Doors: White to match color of coiling door (see Paragraph 3.6.4).

3.6.3.2 Frames: Product of PPG. Blue; submit color to KEH for approval.

3.6.4 Overhead Coiling Doors: Product of PPG. White; submit color to KEH for approval.

3.6.5 Interior Perimeter Steel Base Plate: Prime to match existing primed components of metal building.

3.6.6 Sprinkler System: Red, No. 21105 in accordance with FED-STD-595.

3.6.7 Where paint is scheduled, but color is not specifically called out in the above Schedule, the surface shall match surround areas.

END OF SECTION

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SECTION 13120  
PRE-ENGINEERED STRUCTURES

PART 1 - GENERAL

1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

1.1.1.1 American Institute of Steel Construction, Inc (AISC)

AISC M011-1980	Manual of Steel Construction, 8th Edition
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1.1.1.2 American Iron and Steel Institute (AISI)

1986 Edition	Specification for the Design of Cold-Formed Steel Structural Members
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1.1.1.3 American National Standards Institute (ANSI)

ANSI A58.1-1982	American National Standard Minimum Design Loads for Buildings and Other Structures
-----------------	--

ANSI A156.1-1981	American National Standard for Butts and Hinges
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ANSI A156.13-1987	American National Standard for Mortise Locks and Latches
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1.1.1.4 American Society for Testing and Materials (ASTM)

A 446-87	Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality
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A 525-87	Standard Specification for General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process
----------	---

C 665-86

Standard Specification for  
Mineral-Fiber Blanket Thermal  
Insulation for Light Frame  
Construction and Manufactured  
Housing

- 1.1.1.5 American Welding Society (AWS)  
AWS D1.1-88 Structural Welding Code - Steel
- 1.1.1.6 International Conference of Building Officials (ICBO)  
1988 Edition Uniform Building Code (UBC)
- 1.1.1.7 Metal Building Manufacturers Association (MBMA)  
1986 Edition Low Rise Building Systems Manual
- 1.1.1.8 Underwriters Laboratories, Inc. (UL)  
1989 Building Materials Directory
- 1.2 SUBMITTALS: Refer to Section 01300 for submittal procedures.
- 1.2.1 Erection Instructions and Diagrams: Submit as necessary to erect building and install components, including the following.
- 1.2.1.1 Anchor bolt layouts and sizes.
- 1.2.1.2 Structural connections.
- 1.2.1.3 Roofing and siding connections.
- 1.2.1.4 Joint sealing and caulking.
- 1.2.1.5 Door frame installation.
- 1.2.1.6 Flashings.
- 1.2.1.7 Accessory installation.
- 1.2.1.8 Details and instructions necessary for assembly.
- 1.2.1.9 Fabrication drawings necessary to supplement instructions and diagrams.
- 1.2.2 Certificates of Conformance or Compliance
- 1.2.2.1 Radioactive Mixed Waste Storage Facility: Fabrication drawings shall be accompanied by stress values, design calculations, and certificate signed by registered professional structural engineer, stating design criteria and procedures used and attesting to adequacy and accuracy of design.



1.2.2.2 Backflow Preventer Building: Submit certificates from the manufacturer attesting that materials meet requirements of the specification and referenced documents.

1.2.3 Color Samples: Colors used on Project will be selected by KEH. Submit samples from manufacturer's standard.

### 1.3 SYSTEM DESCRIPTION

1.3.1 Radioactive Mixed Waste Storage Facility: Multiple-span structure, rigid frame beam and column type.

1.3.1.1 Primary framing: Rigid frame of rafter beams and columns, intermediate columns, braced end frames, end wall columns, and wind bracing or roof and wall panels braced and tied.

1.3.1.2 Secondary framing: Purlins, girts, eave struts, flange bracing, sill supports, clips and other items required for complete installation.

1.3.1.3 Wall and roof system: Preformed metal panels of vertical profile, and accessory components.

1.3.2 Backflow Preventer Building: Single span structure, self-framing type.

1.3.2.1 Wall and roof system: Performed metal panels of vertical profile, with insulation, liner sheets, ceiling panels, and accessory components.

1.3.3 Design Criteria, for Both Buildings: Design building and components in accordance with applicable sections of AISC M011, MBMA "Metal Building Systems Manual", AISI "Specification for the Design of Cold-Formed Steel Structural Members", and UBC.

1.3.3.1 Basic design shall include live, dead, snow, wind, and seismic loads. Other design loads, either static or dynamic, shall be considered auxiliary loads.

1.3.3.2 Vertical live and snow loads: Design roof for dead load plus 20 psf uniformly distributed live and dead loads.

1.3.3.3 Wind loads: Design in accordance with ANSI A58.1, Section 6, using following criteria.

- a. Basic wind speed: 70 mph.
- b. Importance factor: 1.07
- c. Exposure category: C.

1.3.3.4 Seismic loads: Design in accordance with UBC, Section 2312, using following criteria.

- a. Seismic zone factor: 0.2.
- b. Importance factor: 1.25 for Radioactive Mixed Waste Storage Facility; 1.00 for Backflow Preventer Building.
- c. Site coefficient factor: 1.2.

1.3.3.5 Auxiliary loads

- a. Design roof framing for load of 10 psf to accommodate loads imposed on building from piping, lighting fixtures, and equipment, including automatic fire sprinkler system. Provide method for fastening equipment to roof.
- b. Magnitude, quantity, and location of auxiliary loads shown on the Drawings or described in this Section.

1.3.3.6 Maximum deflection in roofing or roof panels shall not exceed 1/180th of spans, and maximum deflection in siding or wall panels shall not exceed 1/90th of spans.

1.3.3.7 Provide drainage to exterior for water entering or condensation occurring within cladding system.

1.3.3.8 Thermal resistance for Backflow Preventer Building

- a. Wall system: R value of 11.
- b. Roof system: R value of 19.

1.3.3.9 Install building completely weathertight, free of abrasions, loose fasteners, and deformations.

1.3.3.10 Weld steel in accordance with AWS D1.1.

1.4 DELIVERY, STORAGE, AND HANDLING

1.4.1 Deliver, store, handle, and erect prefabricated components, panels, and other manufactured items in manner that will not damage or deform.

1.4.2 Examine sheets and panels upon arrival at site and, if found to be wet, remove moisture, restack, and protect until used. Replace damaged or defaced components unless they can be repaired to satisfaction of KEH.

1.4.3 Stack materials stored at site before erection on platforms or pallets and cover with tarpaulins or other suitable weathertight covering.

1.4.4 Store metal sheets or panels so water which may have accumulated during transit or storage will drain off.

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1.4.5 Do not store sheets or panels in contact with materials that may cause staining.

## 1.5 WARRANTY

1.5.1 Building shall be warranted against water leaks arising out of or caused by ordinary wear and tear by elements for period of 5 years. Warranty shall start upon final acceptance of Work or date Operating Contractor takes possession, whichever is earlier.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

#### 2.1.1 Radioactive Mixed Waste Storage Facility

##### 2.1.1.1 Wall and Roof Systems

a. Sheet steel stock: ASTM A 446 zinc-coated (galvanized) to ASTM A 525, G90. Factory color finished.

b. Wall system: 0.0217 inch (26 gauge), exposed fastening panels. ECN-6

c. Roof system: 0.0276 inch (24 gauge), exposed fastening panels. ECN-6

##### 2.1.2 Backflow Preventer Building

##### 2.1.2.1 Wall and roof system

2.1.2.2 Wall system: 0.0276 inch (24 gauge), ASTM A 446 galvanized to ASTM A 525, G90. Factory color finished with concealed fastening panels. ECN-6

2.1.2.3 Roof system: 0.0276 inch (24 gauge), exposed fastening with interlocking side ribs. ASTM A 446, zinc-coated to ASTM A 525, factory color finished. ECN-6

##### 2.1.2.4 Insulation and vapor barriers

a. Blanket and batt insulation: Mineral fiber insulation meeting the requirements of ASTM C 665. Insulation containing asbestos will not be acceptable. Insulation shall be UL listed and have "flame spread" of 25 or less, and "smoke developed" of 50 or less.

1) Wall insulation: Type II batts with minimum thermal resistance of R-11 and faced with vinyl scrim facing vapor barrier covering on 1 side. Insulation shall be capable of fitting into available space without compressing more than 10 percent in thickness.

2) Roof insulation: Type II batts with minimum thermal resistance of R-19 and faced with vinyl scrim facing vapor barrier covering on 1 side.

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b. Insulation clips: Manufacturer's standard wall and roof clips.

#### 2.1.2.5 Metal liner panels

a. Metal liner designed and fabricated by Armco Steel Corporation.

b. Minimum thickness: 0.0276 inch galvanized flush panels, maximum 1 inch profile, galvanized to ASTM A 525, G90 with factory precoated finish.

c. Liner shall extend from floor to ceiling. Provide matching metal trim at base of wall liner, top of wall liner, around openings in walls, and over interior and exterior corners.

#### 2.1.2.6 Door and door frames

a. Doors shall be hollow metal, 1-3/4 inch full flush type, 3'-0" by 7'-0" insulated, with 0.0359 inch face sheets and 0.0747 inch closure channels at top and bottom.

b. Door frames: Minimum 4-3/4 inch wide jamb, 0.0598 inch steel with four wall anchors for each jamb and two anchors at the head.

c. Mortise and reinforce doors and frames for locksets, strikes, and hinges. Drill and tap reinforcement for hardware.

#### 2.1.2.7 Hardware

a. Hinges: 4-1/2 by 4-1/2 inch steel template butts, 652 finish, with ball bearing action, meeting the requirements of Type A8111, ANSI A156.1. Provide 1-1/2 pair butts for each leaf.

b. Lockset: Mortise cylinder type meeting the requirements of ANSI A156.13, series 1000, F13 function, 626 finish, Corbin 863-9565.

c. Lock cylinders: Six pin tumbler with Corbin 59 keyway for each lockset, 626 finish. Key all locks to match existing master-key system as directed by KEH.

d. Furnish each lock cylinder with 2 keys.

e. Threshold: Pemko 157A extruded aluminum.

f. Weatherstripping: Pemko 319AN extruded aluminum.

g. Door bottom: Pemko 411AV extruded aluminum.

h. Door stop: Exterior steel post-mounted, automatic door holder, aluminum finish, No. P8015, as manufactured by Builders Brass Works Corporation.

2.1.3 For Both Buildings

2.1.3.1 Sealant: Manufacturer's standard elastomeric, nonstaining type.

2.1.3.2 Fasteners: Manufacturer's standard type, finished to match adjacent surface when exterior exposed.

2.1.3.3 Accessories

a. Flashing, trim, caps, and similar metal accessories shall be of same thickness, material and finish used for adjacent wall or roof coverings.

b. Gutter and downspout fabrication:

1) Fabricate of same material and finish as wall metal.

2) Form gutters and downspout to collect and remove water flow from roof resulting from rain falling at rate of 3 inches per hour for 5 minute duration.

2.1.3.4 Closure Strips: Formed of compressed rubber, synthetic rubber, bituminous impregnated materials, or metal of same respective type as roof and wall panels, and standard with manufacturer. Molded closure strips shall be free of open voids and shall not absorb or retain water. Closure strips shall be formed to match corrugations or configurations of roofing or siding being used, and provided where shown and necessary for weathertight construction.

2.1.3.5 Louver and vents: See Section 15500.

2.1.3.6 Non-shrink grout: See Section 03300.

2.1.4 Finish: Precoated enamel on steel with color selected from manufacturer's standards by KEH.

PART 3 - EXECUTION

3.1 INSTALLATION

3.1.1 Erect in accordance with manufacturer's approved erection instructions and diagrams.

3.1.2 Set structural elements on nonshrink grout specified in Section 03300.

3.1.3 Insulate dissimilar materials, not compatible when in contact, from each other by gaskets or insulating compounds.

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### 3.1.4 Wall and Roof Systems

3.1.4.1 Exercise care when cutting prefinished material to ensure cuttings do not remain on finish surface.

3.1.4.2 Fasten cladding system to structural supports, aligned level and plumb.

3.1.4.3 Use exposed fasteners for roof system and exposed or concealed fasteners for wall system.

3.1.4.4 Install sealant and gasket to prevent weather penetration.

3.1.4.5 System: Free of rattles, noise due to thermal movement, and wind whistles.

3.1.5 Attach gutters and downspouts to building. Install gutters to provide drainage.

3.1.6 Attach louvers and ventilators to supporting construction to assure rain-tight installation.

3.1.7 Anchor doors, including frames and hardware, to supporting construction, install plumb and true, and adjust to provide proper operation.

3.1.8 Insulation: Except as otherwise shown on the Drawings or approved, install insulation against covering and between supporting members to present neat appearance. Blanket insulation shall have facing at joints lapped and fastened to provide tight joints.

3.1.9 Fasten wall liner and ceiling panels into place to present neat appearance.

3.1.10 Field Painting: Upon detection, abraded or corroded spots on shop-painted surfaces shall be wire brushed and touched up with same material used for shop coat. Shop-primed ferrous surfaces exposed on outside of building and shop-primed surfaces of doors shall be painted with 2 coats of approved exterior enamel. Factory color finished surfaces shall be touched up as necessary with manufacturer's recommended touch-up paint.

### 3.2 FIELD QUALITY CONTROL

3.2.1 Inspect final installation for compliance with manufacturer's recommendations. Provide documentation of inspection.

END OF SECTION

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SECTION 15300  
FIRE PROTECTION

PART 1 - GENERAL

1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

1.1.1.1 American National Standards Institute (ANSI)

ANSI B31.1-1989 Edition

American National Standard Code  
for Pressure Piping - Power  
Piping

1.1.1.2 American Welding Society (AWS)

AWS D1.1-88

Structural Welding Code - Steel

1.1.1.3 Factory Mutual System (FM)

1989 Edition

Approval Guide

1.1.1.4 Federal Standards (FED STD)

FED-STD-595A, Including  
CHGS NOT 1, 2, 3, 4, 5, 6,  
7, 8, And 9

Colors

1.1.1.5 National Fire Protection Association (NFPA)

NFPA 13

Standard for the Installation  
of Sprinkler Systems,  
1989 Edition

1.1.1.6 Underwriters Laboratories, Inc (UL)

1989

Building Materials Directory

1989

Fire Protection Equipment  
Directory

1.2 SUBMITTALS: Refer to Section 01300 for submittal procedures.

1.2.1 Approval Data: Submit information listed in Column 5 of Approval Data List in this Section.

1.2.2 Vendor Information: Submit information listed in Column 5 of Vendor Information List in this Section.

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1.2.3 Design/Fabricator Drawings: Submit design, fabrication and installation drawings of automatic dry pipe sprinkler systems. Design in accordance with NFPA 13 for ordinary hazard occupancy classification. Size system in accordance with pipe Schedule in NFPA 13, Section 8-3. Include applicable requirements of NFPA 13, Article 1-9 and this Section.

1.2.3.1 Identify proposed deviations from specified materials or design requirements in writing.

1.2.3.2 Design shall be prepared under the supervision of, and submittal stamped by a licensed professional fire protection engineer.

1.2.4 Record Drawings: Submit drawings of dry pipe sprinkler systems as installed.

1.2.5 NFPA Test Certificate: Complete Contractor's Material and Test Certificate, in accordance with NFPA 13, Section 1-10.

### 1.3 SYSTEM DESCRIPTION

1.3.1 Each sprinkler system shall include a 6-inch dry pipe valve supplied with standard trim including automatic air maintenance compressor, fire department connection, flow alarm pressure switch, low air pressure supervisory switch, system main drain valve, water motor alarm gong, and valve house low temperature supervisory switch. The systems shall include all other appurtenances required by NFPA 13 and specified herein.

1.3.2 Components of sprinkler system, if not designated in this Section and the Drawings by manufacturer's name and model/figure number, shall be current products of manufacturer and UL listed or FM approved for use intended.

### 1.4 QUALITY ASSURANCE

1.4.1 Welding Documentation: Fabricator shall ensure that welders in his employ are qualified in accordance with AWS or ANSI requirements before performing shop or field welding on structural steel components which are part of this Section. Welder qualification test results shall be made available upon request. Proposed AWS or ANSI welding procedures shall be subject to review.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

#### 2.1.1 Piping

2.1.1.1 Pipe and fittings: Meet the requirements of NFPA 13. Piping shall be steel with threaded or grooved type (rubber gasketed) fittings. Rubber gasketed fittings for use with plain end pipe shall not be used.

2.1.1.2 Rigid and flexible rubber gasketed couplings: Bolted sleeve type for use with grooved-end pipe, with rubber rings for sealing. Couplings and rubber rings shall be approved for use on dry pipe sprinkler systems.

2.1.2 Sealant: See Section 07920.

2.1.3 Paint: See Section 09900.

## 2.2 EQUIPMENT

2.2.1 Water Motor Alarm Gong: Weatherproof mechanical gong with hood, complete with drain and interconnecting piping.

### 2.2.2 Switches

2.2.2.1 Flow alarm pressure switches for installation on the sprinkler systems shall have pressure-actuated, normally-open contacts.

2.2.2.2 An adjustable low air pressure supervisory switch with normally-closed contacts shall be installed on each dry pipe sprinkler system to annunciate a failure to maintain a proper air supply in the system.

2.2.2.3 A low temperature supervisory switch with normally-closed contacts shall be installed in each sprinkler system valve house to annunciate a temperature drop within the valve house below 42 F.

2.2.3 Automatic Sprinklers: Nominal 1/2 inch diameter orifices, rated for high (286 F) temperature classification.

2.2.4 Air Compressor: Provide an air compressor for each of the dry pipe sprinkler systems. A 110 volt, single phase local power supply shall be provided to each valve house as shown on the Drawing.

2.2.5 Sprinkler Cabinet: Provide with required number of sprinkler heads of ratings and types installed, a sprinkler wrench, and locate adjacent to each system riser.

2.2.6 Fire Department Connection: Brass or bronze body and furnished with self-closing double clappers, plugs and chains, automatic ball drip valve, and escutcheon plate. Connection shall be 4 inch IP by 2-1/2 inch HT by 2-1/2 inch HT. Hose threads shall be National Standard Fire Hose threads, 7-1/2 TPI.

## PART 3 - EXECUTION

### 3.1 DESIGN REQUIREMENTS

3.1.1 Design 2 dry pipe sprinkler systems to provide complete sprinkler protection throughout the building in accordance with NFPA 13 for ordinary hazard occupancy classification. Locations of system risers are shown on the Drawing. Size of system risers shall be as specified herein.

3.1.2 The temperature classification for sprinklers located under the roof shall be rated high (286 F).

### 3.2 INSTALLATION

3.2.1 Install dry pipe sprinkler systems in accordance with NFPA 13 and as specified herein.

3.2.2 Coordinate requirements for interruption of existing services and Fire Department stand-by with KEH.

3.2.3 Protect new piping from damage by earthquake, by proper clearance around penetration holes, flexible couplings, and sway bracing, in accordance with NFPA 13, Sections 3-5.3 and associated portions of Appendix A.

3.2.4 Pack pipe penetrations through insulated walls with fiberglass or mineral wool packing and seal both sides with polysulfide sealant. Seal penetrations through uninsulated walls with polysulfide sealant.

3.2.5 Pipe Escutcheons: Install on sides of wall penetrations exposed to view.

3.2.6 Repair damaged surfaces. Refinish repaired or defaced surfaces to match adjacent undisturbed areas.

3.2.7 Terminate exterior discharge, inspectors test, and auxiliary drain lines with 45 degree elbows, turned down.

3.2.8 Provide suitable splash-pads, at exterior discharge locations, on other than paved surfaces.

3.2.9 Paint new system piping exposed to weather conditions on outside of building in accordance with Section 09900. Finish color shall be red (No. 21105) shown in FED STD 595.

#### 3.2.10 Welding

3.2.10.1 Limit onsite welding to fabrication of supports or braces, if necessary. No other on site welding will be permitted.

3.2.10.2 Perform shop welding of piping and attachments to pressure retaining components in accordance with ANSI B31.1 and NFPA 13.

3.2.10.3 Perform welding of steel structural elements in accordance with AWS D1.1.

3.2.10.4 Do not perform welding or flame cutting on or within building without written approval of KEH.

3.2.10.5 Perform visual weld examination in accordance with AWS D1.1 paragraphs 6.5.5 and 8.15, or ANSI B31.1 paragraph 136.4.2 as applicable.

3.2.10.6 Perform dye penetrant weld examination on cover pass of tie-in welds, not to be hydrostatically tested, in accordance with ANSI B31.1 paragraph 136.4.4.

### 3.2.11 Hangers and Supports

3.2.11.1 Hang, support and brace sprinkler system piping from building structural steel members, or to metal supports attached to building structure in accordance with NFPA 13.

3.2.11.2 Use clamping devices when attaching hangers to structural steel. When clamping is impracticable, obtain written authority to weld, punch, drill or cut structural steel members to provide attachment. C-type clamps shall not be used to attach sway braces to building structure (See NFPA 13, Paragraph 3-5.3.5.10).

3.2.11.3 When required, deliver to KEH detailed mathematical analysis, by registered professional engineer, of structural integrity where questionable alterations of building structural components are proposed. Analysis may also be required where obvious deformations of structural members are caused by hanging sprinkler piping.

3.2.12 Signs: Permanent type identification signs shall be installed at control, drain, test, and alarm valves. Legend shall include warning of Fire Department response to operation of valve.

### 3.3 FIELD QUALITY CONTROL

#### 3.3.1 Flushing and Testing

##### 3.3.1.1 General

a. Furnish equipment and instruments required to perform flushing and testing operations described below.

b. Conduct flushing and testing operations while witnessed by KEH.

c. Remove and replace pieces of apparatus, material, or work which fails in flushing or testing operations and retest.

d. Repair damage resulting from flushing or testing to satisfaction of KEH.

##### 3.3.1.2 Flushing: Flush new sprinkler system piping as described below.

a. Flush sprinkler piping by feeding water into system through alarm valve to provide velocity of at least 7 feet per second in piping being flushed.

b. Discharge flushing water from end of cross mains.

c. Discharge flushing water to point designated by KEH. Flushing shall continue until effluent runs clear and free of foreign matter.

d. Provide documented evidence that flushing has been accomplished in accordance with this Section. Deliver to KEH before testing.

3.3.1.3 Hydrostatic test

a. Hydrostatically test new sprinkler system in accordance with NFPA 13, Section 1-11.2.

b. Use hydrostatic test pressure of 200 psi.

c. Leaks in piping will not be acceptable.

3.3.1.4 Dry pipe system tests: Test in accordance with NFPA 13, Section 1-11.3.

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15300 - 7

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Project No. CR9106		9 2 1 2 3 6 6 1 4 3 3											
Project Title RMW Storage Facility		APPROVAL DATA LIST ("X" Indicates Required Data)											
Specification Section 15300													
1  EPN IDENTIFICATION	2  DESCRIPTION	3  REFERENCE DRAWING	4  SPECIFICATION PARAGRAPH	5  DATA									6  REMARKS
				Dimensional Drawings	Equipment Weights	Specifications	Material Description	Performance Data	Circuit or Control Diagrams	Data Sheets	Illustrative Cuts	Installation Instructions	
	Dry Pipe Valves										X		Including all trim
	Water Motor Alarm Gongs										X		
	Fire Department Connections (FDC)										X		
	Check Valve for FDC										X		
	Flow Alarm Pressure Switches										X		
	Low Air Pressure Supervisory Switches										X		
	Low Temperature Supervisory Switches										X		
	Sprinkler Heads										X		
	Rubber Gasketed Rigid and Flexible Couplings										X		
	Air Compressor							X	X		X		

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Project No. CR9106  
 Project Title RMW Storage Facility  
 Specification Section 15300

## VENDOR INFORMATION LIST

\* Including all trim

("X" Indicates Required Data)

1  EPN IDENTIFICATION	2  DESCRIPTION	3  REFERENCE DRAWING	4  SPECIFICATION PARAGRAPH	5 VENDOR INFORMATION (VI)										
				Dimensional Drawings	Equipment Weights	Specifications	Certified Test Data	Circuit or Control Diagram	Instructions			Spare Parts List	Data Sheets	Illustrative Cuts
									Installation	Operation	Maintenance			
	Dry Pipe Valves			X							X	X		X
	Water Motor Alarm Gongs													X
	Fire Department Connections (FDC)													X
	Check Valve for FDC													X
	Flow Alarm Pressure Switches													X
	Low Air Pressure Supervisory Switches													X
	Low Temperature Supervisory Switches													X
	Sprinkler Heads													X
	Rubber Gasketed Rigid and Flexible Couplings													X
	Air Compressor					X		X			X	X		



SECTION 15500  
HEATING, VENTILATING AND AIR CONDITIONING

PART 1 - GENERAL

1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

1.1.1.1 Air Movement and Control Association, Inc (AMCA)

AMCA Standard 210-85

Laboratory Methods of Testing  
Fans for Rating Purposes

1.1.1.2 American Society of Heating, Refrigerating, and Air-Conditioning  
Engineers (ASHRAE)

52-76

ASHRAE Standard Method of  
Testing Air-Cleaning Devices  
Used in General Ventilation  
for Removing Particulate Matter

1.1.1.3 American Society for Testing and Materials (ASTM)

A 307-88a

Standard Specification for  
Carbon Steel Bolts and Studs,  
60 000 PSI Tensile Strength

A 563-88a

Standard Specification for  
Carbon and Alloy Steel Nuts

1.1.1.4 Sheet Metal and Air Conditioning Contractors National Association,  
Inc (SMACNA)

1983, 1st Edition

HVAC Systems--Testing, Adjusting  
and Balancing

1.1.1.5 Underwriters Laboratories, Inc (UL)

1989

Building Materials Directory

1.2 SUBMITTALS: Refer to section 01300 for submittal procedures.

1.2.1 Approval Data: Submit information listed in Column 5 of Approval  
Data List in this Section.

1.2.2 Vendor Information: Submit information listed in Column 5 of  
Vendor Information List in this Section.

1.2.3 Test Data: Submit documentation of test data, dated and signed by contractor executing test.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

2.1.1 Fasteners: ASTM A 307, Grade A or B bolts, with heavy hex nuts meeting the requirements of ASTM A 563, UNC threads, bolt head marking not required. Finish to be cadmium plating or electro-galvanizing.

### 2.2 EQUIPMENT

2.2.1 Wall Exhausters: Units shall be 5 horsepower, 13,340 cfm at 1.25 inches wg static pressure, ACME Propmaster Model K36N or equal. Units shall be equipped with combination OSHA approved drive and inlet guard, and gravity damper. Units shall be belt-driven type, minimum of 2 belts. The motor pulley shall be adjustable for final system balancing. A disconnect switch shall be factory installed and wired from the fan motor to the disconnect junction box. Motors shall be equipped with over-current protection box. Units shall bear the AMCA 210 certified performance seal for air performance. Unit wiring shall be 480 volt, 3 phase, 60 hertz.

2.2.2 Louvers: American Warming and Ventilating, Inc, Model LE-33 or equal. Louvers shall be flanged for flush surface application. Jams shall be constructed with integral downspouts for carrying water from the blades to the louver sill. Screens shall be provided on the interior surface of the louvers and shall be 1/2 inch mesh. Louvers shall be constructed of extruded aluminum with anodized finish with 1 coat of lacquer. Louvers shall be 48 inches by 72 inches, passing 6670 cfm with less than 0.15 inch wg static pressure drop.

2.2.3 Baseboard Heater: Chromalox, Model BBF-41 baseboard heater, suitable for 120 volts, single-phase, 60 hertz. Heater output shall be 1000 watts. Baseboard length shall be 48 inches. Provide Integral thermostat, Model BBFK-7. Unit shall be UL listed.

2.2.4 Dampers: Gravity dampers shall be automatic closing type, rear flanged, sized to fit wall exhauster support steel.

2.2.5 3040 percent ASHRAE-Rated Filters: Initial average filtering efficiency of 30-3540-45 percent when tested in accordance with ASHRAE 52, and having UL Class II listing. Size, 24 inch by 24 inch by 12 inches. Filters to be complete with steel holding frames and retainers.

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PART 3 - EXECUTION

3.1 INSTALLATION

3.1.1 Equipment

3.1.1.1 Install where shown on the Drawings in accordance with manufacturer's instructions.

3.1.1.2 Install filters after construction has been completed and debris removed.

3.2 FIELD QUALITY CONTROL

3.2.1 Testing HVAC Systems

3.2.1.1 After system is installed, place exhaust fans in operation in accordance with manufacturer's instructions. After fans have been in operation for at least 4 hours, test the HVAC systems in accordance with SMACNA Testing, Adjusting and Balancing publication, and under surveillance of KEH.

3.2.1.2 Furnish instruments, materials and labor required to perform testing of systems. Instruments shall have been calibrated by approved testing laboratory with date of calibration marked on them.

3.2.1.3 Do not use instruments which are part of system for testing. Check instruments of system against test instruments.

3.2.1.4 Data to be recorded

a. Record vibration of fan shaft along with testing data for each system specified, except unit heaters, by SMACNA.

b. After test has been performed, submit Test Data report in accordance with Paragraph 1.2.3. Test data shall be tabulated and submitted with flow sheet indicating points of measurement. Include characteristics of systems that were observed during tests. Include failure of system and control components to meet operational functions required by the Drawings and this Section.

3.2.1.5 Testing sequence: Perform in accordance with sequence given by SMACNA.

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## SECTION 16300

### HIGH VOLTAGE DISTRIBUTION (Above 600-Volt)

#### PART 1 - GENERAL

##### 1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

##### 1.1.1.1 American National Standards Institute (ANSI)

ANSI C2-1990 American National Standard  
National Electrical Safety Code,  
1990 Edition

ANSI C57.12.00-1987 American National Standard  
General Requirements for Liquid-  
Immersed Distribution, Power  
and Regulating Transformers

ANSI C57.12.26-1987 American National Standard  
Requirements for Pad-Mounted  
Compartmental-Type, Self-Cooled,  
Three-Phase Distribution Trans-  
formers for Use with Separable  
Insulated High-Voltage Connec-  
tors, High Voltage, 34 500  
Grd Y/19 920 Volts and Below;  
2500 kVA and Smaller

ANSI C80.1-1983 American National Standard for  
Rigid Steel Conduit--Zinc Coated

##### 1.1.1.2 American Society for Testing and Materials (ASTM)

A 475-78 (1984) Standard Specification for  
Zinc-Coated Steel Wire Strand

##### 1.1.1.3 Institute of Electrical and Electronics Engineers (IEEE)

IEEE C62.1-1984 IEEE Standard for Surge Arresters  
for AC Power Circuits

IEEE Std 386-1985 IEEE Standard for Separable  
Insulated Connector System for  
Power Distribution Systems  
Above 600V

1.1.1.4 National Electrical Manufacturers Association (NEMA)

Standards Publication/  
No. FB 1-1988

Fittings, Cast Metal Boxes,  
and Conduit Bodies for Conduit  
and Cable Assemblies

Standards Publication/  
No. WC 8-1976 (R 1982)  
w/Rev through Jan 1983

Ethylene-Propylene-Rubber-  
Insulated Wire and Cable for the  
Transmission and Distribution  
of Electrical Energy

1.1.1.5 Underwriters Laboratories, Inc (UL)

1989

Electrical Appliance and  
Utilization Equipment Directory

1989

Electrical Construction Materials  
Directory

UL 1242-1985

Standard for Intermediate Metal  
Conduit

1.1.1.6 Federal Specifications (FS)

WC 1094 A

Conduit and Conduit Fittings  
Plastic, Rigid

ECN-9

ECN-9

1.2 SUBMITTALS: Refer to Section 01300 for submittal procedures.

1.2.1 Approval Data: Submit information listed in Column 5 of Approval Data List in this Section.

1.2.2 Vendor Information: Submit information listed in Column 5 of Vendor Information List in this Section.

1.3 QUALITY ASSURANCE

1.3.1 Standards: Products shall be identified for intended purpose by Underwriters Laboratories, Inc (UL) in the Electrical Appliance and Utilization Equipment Directory or Electrical Construction Materials Directory, and bear listing mark of laboratory. In absence of mark, submit documentation of applicable listing. Listing and marking by UL is not required for products specified to meet the requirements of a national standard, or designated by manufacturer's part number on the Drawings or in this Section.

1.4 DELIVERY, STORAGE, AND HANDLING

1.4.1 Delivery

1.4.1.1 Cable: Upon delivery to site inspect cable and reels for shipping damage such as:

- a. Marks caused by improper lifting equipment or techniques.
- b. Breaks or cuts in outer covering.



c. Damaged jacket or insulation.

d. Reel damage from mishandling.

1.4.1.2 Test: Operating Contractor will perform dc overpotential test on new cable upon delivery to site. Acceptance criteria is given in Paragraph 3.3.3.

#### 1.4.2 Storage

##### 1.4.2.1 Cable

a. Store reels with flanges resting on hard surface or pallet to prevent sinking into ground.

b. Reel flanges shall not touch cable on other reels.

c. Do not store reels on side. Store with reel axis horizontal.

d. Cap or tape cable ends to prevent entrance of moisture.

#### 1.4.3 Handling

##### 1.4.3.1 Cable

a. Do not drop reels.

b. Slings and forklifts shall not contact cable or protective covering.

c. Use spreader bar when lifting reel with bar and sling.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

2.1.1 Solderless Connectors and Terminal Lugs: Pressure type, rated for use with copper or aluminum conductors.

2.1.2 Solderless Terminals for Insulated Aerial Conductors: Circumferential compression type; Burndy Corp HYLUG Type YA for copper conductors and Type YA-A for aluminum conductors.

#### 2.1.3 Raceways, Fittings and Boxes

2.1.3.1 Conduit shall meet the requirements of appropriate standard as follows.

a. Rigid steel ANSI C80.1

b. Intermediate metal UL 1242

c. PVC FS WC 1094A ECN-9

2.1.3.2 Fittings for rigid steel conduit shall meet the requirements of NEMA FB 1.

2.1.4 Cable: 15 kV single conductor meeting the requirements of NEMA WC 8 for both wet and dry conditions at normal operating temperature of 90 C max.

2.1.4.1 Conductor: Copper, annealed, Class B concentric stranding.

2.1.4.2 Conductor shield: Extruded semi-conducting thermosetting compound, 15 mils thick, minimum.

2.1.4.3 Insulation: Ethylene-propylene-rubber, 220 mils thick, minimum.

2.1.4.4 Insulation shield: Minimum 30 mil extruded nonmetallic covering over insulation with minimum 5 mil nonmagnetic metal component directly over or embedded in covering.

2.1.4.5 Jacket: Black polyethylene, 80 mils average minimum thickness.

2.1.4.6 Cable shall have continuous permanent printing on jacket showing manufacturer's name, trade name, type, size, rated voltage and footage markings. Cable reels shall be marked to show above information and length of each cable. Ends of cable shall have weatherproof seals and both ends exposed on reel, accessible for testing.

2.1.5 Wire Pulling Compound: "Y-er Eas" manufactured by Electro Compound Co, or Polywater manufactured by American Polywater Corp.

2.1.6 Tape

2.1.6.1 Plastic insulating tape: Scotch No. 33+ manufactured by 3M Company or equal.

2.1.6.2 Conduit protection tape: Scotchrap No. 50 manufactured by 3M Company or equal.

2.1.6.3 Silicone rubber termination tape: Scotch No. 70 manufactured by 3M Company or equal.

2.1.7 Insulating Putty: "Scotchfil" manufactured by 3M Company, GE No. 8389 manufactured by General Electric Co, or "Airseal" manufactured by Kearney Company.

2.1.8 Tie Wires: Length, material type and size, and installation method as recommended by line conductor manufacturer.

2.1.9 Connectors: For connecting copper conductors to aluminum conductors shall be manufactured for purpose and listed by UL.

## 2.2 EQUIPMENT

2.2.1 Outdoor Distribution Transformers: Meeting the requirements of ANSI C57.12.26 with kVA and voltage ratings shown on the Drawings. Transformers shall be 3 phase and have two 2-1/2 percent above and below normal high-voltage taps. Transformers shall be designed for pad-mounting. Transformers shall have dead front high-voltage termination arranged for loop feed (Westinghouse Pow-R-Pad) with 15 kV power cable elbow loadbreak connectors per IEEE Std 386 (Elastimold 167 LR-F-2).

2.2.2 Lightning Arresters: Distribution valve type rated 15 kV, 95 kV BIL, for use on 13.8 kV grounded-neutral system, and meeting the requirements of IEEE C62.1. Porcelain bodies shall be wet porcelain with uniform color glaze. Galvanized cap and base hardware shall have bolted clamps for both line and ground connections. Mounting bolts shall be galvanized.

2.2.3 Open Fused Cutouts: 14.4 kV, 100 ampere, extra heavy duty, pole-top; with 8000 asymmetrical amperes RMS rating, Type XS; S&C Electric Cat No. 89022R5-B.

## PART 3 - EXECUTION

### 3.1 PREPARATION

3.1.1 Field Measurements: Scale dimensions on the Drawings show desired and approximate location of equipment, actual locations, distances, and levels shall be governed by field conditions.

### 3.2 INSTALLATION

#### 3.2.1 General

3.2.1.1 Perform work in accordance with ANSI C2.

3.2.1.2 Install products as shown on the Drawings and as specified.

3.2.1.3 Use appropriate special tools when installing devices for which special installation tools are recommended by manufacturer.

3.2.2 Ground System: Use 5/8 inch diameter, 7 strand, special low carbon grade steel cable having Class B zinc coating in accordance with ASTM A 475. Connections shall be exothermically welded and transition from galvanized steel to copper shall be above grade in a dry location.

#### 3.2.3 Conduits

3.2.3.1 Use rigid steel or intermediate metal conduit, or PVC SCH. 80 conduit.

3.2.3.2 Install concealed conduits as directly as possible and with bend radii as long as possible.

ECN-9

ECN-9

3.2.3.3 Make elbows, offsets and bends uniform and symmetrical. Bend conduit with approved bending devices.

3.2.3.4 Cut square, ream and remove burrs. Conduit shall be clean, dry, and free of debris. Immediately after installation, plug or cap exposed ends with standard accessories until wires are installed.

3.2.3.5 Use galvanized steel locknuts and insulated bushings for attachment to enclosures except threaded hubs or sealing locknuts shall be used outdoors or where moisture is present. Threadless fittings will not be permitted for rigid conduit. Use Erickson type couplings where required. Do not use running threads.

3.2.3.6 Set up joints in conduit installed in concrete, underground, or exposed to weather, with high temperature, antiseize, conductive thread lubricant and sealant.

3.2.3.7 Install exposed conduit stubbing up through concrete slabs straight and plumb, lined up, and uniformly spaced. Install at sufficient depth below slab to eliminate part of bend above top of slab. Couple conduit flush with surface of slab. Verify stub-up locations with final equipment arrangements.

3.2.3.8 Wrap conduit, passing from concrete to air, with conduit protection tape 3 inches in concrete to at least 12 inches in earth or 3 inches in air, unless conduit is PVC coated.

#### 3.2.4 Nonaerial Type Conductors

3.2.4.1 Use paint or pressure-sensitive colored tape to identify conductors instead of colored insulation on #4 AWG and larger wire only. Phase color coding shall be A Phase - Red, B Phase - Yellow, and C Phase - Black. Identify equipment grounding conductors clearly throughout system.

3.2.4.2 Use lubricant recommended by cable manufacturer, or wire pulling compound specified, to decrease friction when pulling wire and cable through conduit.

3.2.4.3 Do not install or handle wires with thermoplastic insulation or jacket when ambient temperature is 15 F or below.

#### 3.2.5 Splices, Taps and Cable Terminations

3.2.5.1 Make splices and taps with solderless connectors described in Paragraph 2.1.1. Use connectors in accordance with manufacturer's instructions.

3.2.5.2 Use plastic insulating tape for uninsulated splices and taps to thickness at least equal to conductor insulation. Where bolted splice or connection presents irregular surface, apply insulating putty to joints before taping.

3.2.5.3 Follow manufacturer's instructions and directions for splices, stress cones and cable terminations.

3.2.5.4 Wrap terminations for stranded insulated conductors on aerial equipment with 2 half-lapped layers of plastic insulating tape from 2 inches back on cable insulation to cover barrel of terminal. Taping shall effect moisture barrier so moisture cannot penetrate between conductor and insulation or interstices of stranded conductor. Overlay 1 half-lapped layer of silicone rubber termination tape over plastic insulating taping.

### 3.2.6 Aerial Conductors

3.2.6.1 Clearances shall be maintained for cables and conductors in accordance with the Drawings, and ANSI C2.

3.2.6.2 Make splices under tension mechanically and electrically secure by compression fittings. Do not use self-gripping or automatic tension splicing sleeves. Make taps between primary wires and jumpers with mechanical connectors.

3.2.6.3 Install hot line stirrups on existing conductors where new feeder taps are made.

3.2.6.4 Sag conductors in accordance with ANSI C2 for medium loading districts and manufacturer's specification.

3.2.7 Aerial Equipment Grounding: Ground fused switches and lightning arresters in accordance with the Drawings. Bond together pole line hardware separated by less than 2 inches. Connect grounding conductors with split-bolt connector.

### 3.2.8 *Underground Duct Banks*

3.2.8.1 *PVC Sch. 80 conduit shall be used in concrete encased duct banks.*

3.2.8.2 *Form concrete encasements unless written waiver is obtained from KEH.*

### 3.3 FIELD QUALITY CONTROL

#### 3.3.1 Testing, General

3.3.1.1 Test equipment and wiring for continuity and unintentional grounds, and verify proper phase sequence and voltage at equipment served before attempt is made to operate equipment. Notify KEH before start of tests. Correct items found, during testing or examination by KEH, to be at variance with the Drawings and this Section.

3.3.1.2 Furnish instruments, labor and equipment required to conduct the testing.

ECN-9

ECN-9

3.3.1.3 Use test instruments which bear valid calibration stamp showing date of calibration and expiration date of stamp. Calibration and accuracy of test instruments shall be certified by independent testing laboratory having standards traceable to the National Bureau of Standards.

3.3.1.4 In addition to testing specified to be performed by Contractor, installation will be subject to examination by KEH for conformance with design and applicable codes. Assist KEH as requested.

### 3.3.2 Acceptance Testing

3.3.2.1 Upon receipt of new cable, Operating Contractor will perform following tests.

<u>Test</u>	<u>Acceptance Criteria</u>
a. dc Test Overpotential (Hi-Pot) 15 kV dc shielded cable tested at 55 kV dc for 15 minutes.	Leakage current not to exceed 5 micro-amps.

3.3.2.2 After installation Operating Contractor will perform the following tests to verify acceptability of installation.

<u>Test</u>	<u>Acceptance Criteria</u>
a. Transformer	
. Routine	ANSI C57.12.00
. Resistance Measurement	Not applicable, for base data
. Combustible Gas	Less than 0.5 percent
. Oil Neutralization Number	Less than 0.1 mg KOH/gram
. Oil Dielectric	18 kV or greater
. Oil Interfacial Tension	18 dynes/Cm or greater
. Askarel Content	1 PPM
. Oil Power Factor	1 percent
b. Cable	
. ac Power Factor (not to exceed rated voltage of cable).	Power factor not to exceed 2 percent.
. dc Overpotential (Hi Pot) 15 kV shielded cable tested at 55 kV dc for 15 minutes.	Leakage current not to exceed 5 micro-amps.
. Shield resistance test for shield-to-termination continuity between phases and between each phase and ground. Observe uniformity between resistance readings.	Resistance readings greater than 5 ohms are generally indication of discontinuity (or open circuit) and are not acceptable.

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## SECTION 16400

### SERVICE AND DISTRIBUTION (600-Volt and Below)

#### PART 1 - GENERAL

##### 1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

##### 1.1.1.1 American National Standards Institute (ANSI)

ANSI C80.1-1983 American National Standard for  
Rigid Steel Conduit--Zinc Coated

ANSI C82.1-1977 American National Standard  
Specifications for Fluorescent  
Lamp Ballasts

ANSI C97.1-1972 American National Standard for  
Low-Voltage Cartridge Fuses,  
600 Volts or Less

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##### 1.1.1.2 American Society for Testing and Materials (ASTM)

A 475-78 (1984) Standard Specification for  
Zinc-Coated Steel Wire Strand

##### 1.1.1.3 Federal Specifications (FS)

W-C-375B, Including  
Notice 1 Circuit Breakers, Molded Case;  
Branch Circuit And Service

WC 1094A Conduit and Conduit Fittings  
Plastic, Rigid

ECN-9  
ECN-9

W-F-406D Fittings For Cable, Power,  
Electrical And Conduit, Metal,  
Flexible

W-P-115B Panel, Power Distribution

W-S-896E, Including  
AMD 2 and Notice 1 Switches, Toggle (Toggle And  
Locks), Flush Mounted (General  
Specification)

WW-C-566C Conduit, Metal, Flexible

1.1.1.4 National Electrical Manufacturers Association (NEMA)

Standards Publication/  
No. FB 1-1988

Fittings, Cast Metal Boxes, and  
Conduit Bodies for Conduit and  
Cable Assemblies

9 2 1 2 3 6 9 1 4 5 2

Standards Publication/  
No. ICS 2-1983 w/Rev through  
Jun 1985

Standards for Industrial Control  
Devices, Controllers, and  
Assemblies

Standards Publication/  
No. ICS 6-1988

Enclosures for Industrial  
Controls and Systems

Standards Publication/  
No. PB 1-1984

Panelboards

Standards Publication/  
No. RN 1-1986

Polyvinyl-Chloride (PVC)  
Externally Galvanized Rigid  
Steel Conduit and Intermediate  
Metal Conduit

Standards Publication/  
No. ST 20-1986

Dry-Type Transformers for General  
Applications

Standards Publication/  
No. WD 1-1983

General Requirements for Wiring  
Devices

1.1.1.5 National Fire Protection Association (NFPA)

NFPA 70

National Electrical Code,  
1990 Edition

1.1.1.6 Underwriters Laboratories, Inc (UL)

1989

Electrical Appliance and  
Utilization Equipment Directory

1989

Electrical Construction Materials  
Directory

UL 797-1977

Standard for Electrical Metallic  
Tubing

UL 1242-1985

Standard for Intermediate Metal  
Conduit

1.2 SUBMITTALS: Refer to Section 01300 for submittal procedures.

1.2.1 Approval Data: Submit information listed in Column 5 of Approval  
Data List in this Section.

1.3 QUALITY ASSURANCE

1.3.1 Standards: Products shall be identified for intended purpose by  
Underwriters Laboratories, Inc (UL) in the Electrical Appliance and  
Utilization Equipment Directory or Electrical Construction Materials  
Directory, and bear listing mark of laboratory. In absence of mark, submit  
documentation of applicable listing. Listing and marking by UL is not

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required for products specified to meet the requirements of a national standard, or designated by manufacturer's part number on the Drawings or in this Section.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

2.1.1 Solderless Connectors and Terminal Lugs: Pressure type, rated for use with copper or aluminum conductors with insulating caps or covers rated for system utilization voltage. Connectors shall be types specified below.

2.1.1.1 For conductors #8 AWG and smaller.

- a. Ideal Industries, Inc "Wire-Nuts."
- b. Thomas and Betts Company "Sta-Kon."
- c. 3M Company "Scotchlok."

2.1.1.2 For conductors #6 AWG and larger.

- a. Burndy Engineering Company "Screw Pressure Connectors" or "Hydent."
- b. Thomas and Betts Company "Lock-tite."

2.1.2 Raceways, Fittings and Boxes

2.1.2.1 Conduit shall meet the requirements of appropriate standard as follows.

- |                                     |             |
|-------------------------------------|-------------|
| a. Rigid steel                      | ANSI C80.1  |
| b. Intermediate metal               | UL 1242     |
| c. Electrical metallic tubing (EMT) | UL 797      |
| d. Flexible metal                   | FS WW-C-566 |
| e. PVC                              | FS WC 1094A |

ECN-9

2.1.2.2 PVC coating on rigid steel conduit: Factory applied, and meeting the requirements of NEMA RN 1, Type A-40.

2.1.2.3 Conduit fittings for rigid steel and electrical metallic tubing shall meet the requirements of NEMA FB 1. Only compression type threadless fittings shall be used with EMT.

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2.1.2.4 Fittings used with flexible metal conduit shall meet the requirements of FS W-F-406 and be squeeze type only. Flexible metal conduit shall have integral ground conductor.

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2.1.2.5 Use "Myers" type watertight fittings or sealing locknuts manufactured by Midwest Electric Manufacturing Corp, for conduit entries into sides or tops of NEMA Type 3 or NEMA Type 3R enclosures.

2.1.2.6 Interior lighting fixture outlet boxes: 4 inch octagonal pressed steel.

2.1.2.7 Exterior lighting fixture outlet boxes: Cast with threaded hubs.

2.1.2.8 Interior receptacle outlet boxes: 4 inch square by 2-1/8 inches deep, pressed steel with 4 inch square cover.

2.1.2.9 Exterior receptacle outlet boxes: Cast metal Type FD.

2.1.2.10 Telephone outlet boxes: 4 inch square by 2-1/8 inch deep pressed steel with cover plate for single device.

2.1.3 Conductors: Copper, type and AWG size specified on the Drawings.

2.1.3.1 Conductor insulation: Type THWN/THHN or XHHW.

2.1.3.2 Conductor No. 10 and smaller shall be solid *or stranded*; No. 8 and larger shall be stranded.

ECN-41

2.1.4 Wiremarkers: Imprinted tubular plastic.

2.1.5 Nameplates: Laminated plastic stock, 1/16 inch thick, white surface with black core with beveled edges. Engraving shall be 1/8 inch minimum block style. Size nameplates to meet legend requirements.

2.1.6 Concrete and Masonry Anchors: Kwik-Bolt manufactured by Hilti Fastening Systems or Red Head Wedge Anchor manufactured by Phillips Drill Company.

2.1.7 Wire Pulling Compound: "Y-er Eas" manufactured by Electro Compound Company or Polywater manufactured by American Polywater Corp.

2.1.8 Tape

2.1.8.1 Plastic insulating tape: Scotch No. 33+ manufactured by 3M Company.

2.1.8.2 Conduit protection tape: Scotchrap No. 50 manufactured by 3M Company.

2.1.9 Insulating Putty: "Scotchfil" manufactured by 3M Company, GE No. 8389 manufactured by General Electric Co, or "Airseal" manufactured by Kearney Company.

2.1.10 Duct Sealing Compound: "Sealex" manufactured by Porcelain Products Co or "Kerite" manufactured by Kerite Co.



2.1.11 Hangers for Individual Conduits: Factory made springable wrought steel clamps or malleable iron, split and hinged rings. For suspended conduit, clamps or rings shall be bolted to, or interlocked with threaded suspension rod.

2.1.12 Sealant: See Section 07920.

2.1.13 Grounding Systems

2.1.13.1 Conductors: Buried ground cable shall be 5/8 inch diameter, 7 strand, special low carbon grade steel with Class B zinc coating in accordance with ASTM A 475. Exposed bonding conductor shall be No. 6 bare solid copper minimum.

2.1.13.2 Ground rods: 5/8 inch diameter by 8'-0" long galvanized steel.

2.1.13.3 Ground connections shall be exothermically welded using appropriate molds and cartridges; Erico or equal.

2.1.13.4 Ground plates: 2-1/2 inch square with 4 tapped holes. 3/8 inch by 16-1/2 inch deep; Erico Products No. S-330.

2.1.13.5 Equipment grounding conductors shall be included in all raceways containing feeders, branch circuits, or control circuits of 120 volts or greater.

## 2.2 EQUIPMENT

2.2.1 Equipment enclosures shall meet the requirements of NEMA ICS 6-110 and be Type 1, 3, or 3R.

2.2.2 Panelboards: Rating shown on panelboard schedule, UL labeled, and meeting the requirements of NFPA 70 (NEC), NEMA PB 1 and FS W-P-115. Flush or surface mounting as shown on panelboard schedule.

2.2.2.1 Provide with main circuit breaker.

2.2.2.2 Provide doors with flush-type combination catch and locks, keyed alike and furnished with 2 keys for each panelboard. Provide each panelboard with directory card holder and card for branch circuit load identification.

2.2.2.3 Furnish with nameplate engraved with designation shown on panelboard schedule. Attach nameplate to front of panelboard above door.

2.2.2.4 Branch circuit breakers: Molded case bolt-on type with thermal magnetic trips, meeting the requirements of FS W-C-375. Number, rating and arrangement are shown on panelboard schedule or one-line diagram. Permanently number branch circuits. Number tabs shall not be attached to, or be part of, circuit breaker.

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a. Branch circuit breaker positions marked "space": Bussed for future circuit breakers. Provide removable single pole filler plates for spaces shown on panelboard schedule.

b. Branch circuit breakers marked "S" shall be UL listed for switching duty.

c. Branch circuit breakers marked "G" shall include ground fault circuit interrupter.

2.2.3 General Purpose Transformers: Dry type, 60 hertz, of kVA rating shown on the Drawings with minimum two 2-1/2 percent taps above and two 2-1/2 percent taps below normal rated primary voltage. Insulation system rated 70 C with 115 C winding temperature rise above ambient. Transformers shall be floor-mounting and meet the requirements of NEMA ST 20.

2.2.4 Combination Motor Controllers: Horsepower rated, with 2 NO and 2 NC auxiliary contacts. Bimetallic type overload elements are acceptable. Overload relay reset and momentary contact start-stop pushbutton in cover. Circuit breakers shall meet the requirements of FS W-C-375 and be thermal magnetic trip or instantaneous motor circuit protector type. Controllers shall meet the requirements of NEMA ICS 2-321.

2.2.5 Magnetic Contactors: NEMA Size 1, having 8 normally open contacts, and operating coil rated at 277V ac, with NEMA 1 enclosure. Contactors shall meet the requirements of NEMA ICS 2-211.

#### 2.2.6 Terminal Blocks

2.2.6.1 For #10 AWG conductors and smaller: Either 1-piece or factory assembled sectional double terminal, barrier type, with binder screw terminals. Terminal ampacities shall be equal to or greater than conductor ampacities; Marathon or Buchanan.

2.2.6.2 Incoming power terminal block located at building service transformer pad shall be phenolic with high conductivity tin-plated copper connector to accommodate one 500 MCM through #4 AWG line side conductor and six #2 AWG through #14 AWG load side conductors; Marathon GP Series.

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2.2.6.3 Furnish covers to cover live parts of terminations for circuits of more than 150 volts to ground. Provide with means for ready inspection and full width marking areas.

2.2.7 Lighting Fixtures: Furnish with parts and fittings necessary to install in accordance with manufacturer's instructions.

2.2.7.1 Fixtures of each type described shall be of 1 manufacturer and identical finish and appearance.

2.2.7.2 Fluorescent fixture ballasts: High power factor type, rated for voltage shown on the Drawings or in this Section, suited for fixture

temperature environment, and provided with automatic resetting thermal protector. Ballasts shall meet the requirements of ANSI C82.1.

2.2.7.3 Catalog numbers, when called out in subparagraph 2.2.7.4, are for individual units.

2.2.7.4 Lighting fixtures shall be as follows.

a. Fixture A: Industrial fluorescent, 8 feet, 2-F96TR Slimline lamps, 277 volt, 10 percent up-light component, with wire guard. Ballast shall be CBM/ETL unit with operating temperature range to 0 F. Metalux catalog No. IA-296A-277-V.

b. Fixture B: Industrial fluorescent, same as Fixture A except to include an emergency power-pak in fixture wireway.

c. Fixture D: Outlet box lamp holder, porcelain, medium base, keyless, 660 watts, 250 volt, with 2 screw terminals and 100 watts incandescent lamp.

d. Fixture E: Exterior low-pressure sodium wall pack, 55 watts, 120 volt, aluminum body with polycarbonate lens and up-light shield, and internally-mounted photocell. Voigt catalog No. 0-36-120-PI.

e. Fixture F: Exterior low-pressure sodium wall pack; same as Fixture E except 135 watts. Voigt catalog No. 0-38-120-PI.

2.2.7.5 Exit sign: Self-powered wall-mounting unit with 6 inch high, 3/4 inch slash, green letters on white background. Sign shall be illuminated by sealed tritium gas tubes coated internally with phosphor. Unit shall be capable of 12 years maintenance-free continuous operation. Self-Powered Lighting, Inc No. 710A-1-WG-S.

2.2.7.6 Photoelectric cell controls: Diecast aluminum weatherproof housing with hermetically sealed light sensitive element, having manually adjustable light level slide with turn-on range of 2 foot-candles.

2.2.8 Receptacles: Duplex, brown, specification grade, rated 15 ampere, 120 volt, 3 wire, grounding type, meeting the requirements of NEMA WD 1 Designation 5-15R with screw terminals arranged for side wiring. Self-grounding receptacles may be used instead of ground requirements specified.

2.2.9 Toggle Switches: Brown, specification grade, 3 way, rated 20 amperes, 277 volts, with conventional handles, screw terminals arranged for side wiring, and meeting the requirements of FS W-S-896.

2.2.10 Plates

2.2.10.1 Receptacle: Finish pressed steel.

2.2.10.2 Toggle switch: Finish pressed steel.

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2.2.11 Paging System

2.2.11.1 Amplifier: 35 watts of output power, 100 hertz-10 kHz frequency response, with 2 MIC and 1 AUX inputs, balanced low-impedance microphone inputs, and individual bass and treble controls. Bogen Model C35C.

2.2.11.2 Microphone: Desk type dynamic, omni directional, push-to-talk operation with locking feature, dual impedance, die cast base, and 7'-0" cord. Bogen Model MBS-1000.

2.2.11.3 Speakers, Indoor: 7.5 watt (adjusted for 5 watt operation) variable impedance, with 6 inch diameter projector. Bogen Model SPT-5A.

2.2.11.4 Speaker, Outdoor: 15 watt, variable impedance, weatherproof, with all-purpose mounting bracket. Bogen Model SPT-15A.

2.2.12 Beacon: Flashing, 120V ac, with red acrylic dome, and polished stainless steel parabolic reflectors. Unit shall be weatherproof and designed for mounting on 1/2 inch NPT threaded conduit. Edwards Adaptableacon Cat No. 50R.

2.2.13 Bell: Vibrating, weatherproof, 120V ac, 6 inch with back box. Edwards Adaptable Cat No. 340-6N5.

2.2.14 Pushbutton Station: Oiltight in cast enclosure, single NO-NC contact block, standard pushbutton without legend plate. Provide nameplate as specified in Paragraph 2.1.5, engraved "CAM alarm test." Cutler-Hammer 10250T4342.

2.2.15 Metering

2.2.15.1 Watthour demand meter, -socket type, -7-terminal, -240-volt type, class-100, -with pulse generator: -R/P-625/54, -kilowatt-hour/pulse-0.25, -and sweep hand type register with a 30 minute demand interval. -G.E. No. VMW-65-S, with D-72 pulse generator or similar. Watthour demand meter, socket type, General Electric type VMW-65-S, class 10, 120v, for use with 3-400:5 CT's and 2-288/120v PT's, 225 kVA maximum load, complete with pulse generator, kWh/Pulse = 0.25, pulse ratio (R/P) = 625/864 and sweep hand type register with a 30 minute demand interval.

2.2.15.2 Meter-socket-and-enclosure, -7-terminal-with-manual-or-automatic circuit-closing-devices, -600-volt-rated, -NEMA-3R-construction. -Circle AW No. U121317 or similar. Meter socket and CT enclosure, 400 amp maximum, type 3R construction with CT mounting base (Circle AW Cat No. 6067-A), sealing ring, and removeable test switch perch - Circle AW Cat No. 112013

2.2.15.3 Grounding Lug, Circle AW 4-25145 or similar.

2.2.15.4 Test Switch, Superior Cat No. 1041-F

2.2.15.5 Current Transformer, General Electric Type JCW-0

ECN-1

ECN-11

ECN-11

ECN-11

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2.2.15.6 *Potential Transformer with primary fuse, General Electric Type JVP-1.*

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2.2.16 *Safety Switches: Meeting the requirements of NEMA KS 1 and fusible, heavy duty type HD, horsepower rated for 600 V ac as noted on the Drawings. Fuses shall be cartridge type, single element, Class J, and meet the requirements of ANSI C97.1. Enclosure shall be NEMA Type 3R.*

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### PART 3 - EXECUTION

#### 3.1 PREPARATION

3.1.1 *Field Measurements: Scale dimensions on Drawings show desired and approximate location of equipment; actual locations, distances, and levels shall be governed by field conditions.*

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3.2 INSTALLATION

3.2.1 General

3.2.1.1 Perform work in accordance with the NEC.

3.2.1.2 Fasten equipment to structural members of building or metal supports attached to structure, or to concrete surfaces.

a. Use clamping devices for attaching to structural steel, or, when clamping is impracticable, obtain written authority from KEH to weld to, drill or cut structural members to provide attachment.

b. Fasten equipment to concrete or masonry with expansion anchors.

c. Attach to drywall by screws into studs, and to metal wall panels by weld studs, bolts or self-tapping metal screws.

d. Locate equipment, boxes and conduit approximately where shown in relation to equipment served.

e. Do not install conduit raceways and boxes in positions that interfere with work of other trades.

f. Identify components by nameplate engraved with designation and function shown on the Drawings.

g. Attach nameplates on or near equipment with clear RTV silicone sealant.

3.2.1.3 Use appropriate special tools when installing devices for which special installation tools are recommended by manufacturer.

3.2.2 Grounding Systems

3.2.2.1 All welded connections shall be wire brushed and all buried welds and welds exposed to weather shall be coated with asphaltic paint a minimum of 6 inches in each direction from the weld.

3.2.2.2 Grounding cables shall be protected against mechanical damage before and during backfill. Backfill material within 1 foot of cables shall not contain rocks larger than 2 inches in diameter.

3.2.2.3 Connections between galvanized steel and copper conductors shall be above grade and in a dry location.

3.2.2.4 Ground steel column to grounding grid where-shown at each of the four building corners.

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### 3.2.3 Conduit

3.2.3.1 Use rigid steel or intermediate metal where subject to mechanical damage, installed in concrete floors and walls, installed exposed to weather, or installed 4 feet or less above floor. Electrical metallic tubing may be used elsewhere, when connecting electrical equipment 2 feet or less apart, and when entering top of electrical equipment 4 feet minimum above floor. *PVC Sch. 80 conduit to be used underground.*

ECN-9

ECN-9

3.2.3.2 Install #14 gage galvanized steel pull wire or 1/8 inch polyethylene rope in spare conduits.

3.2.3.3 Install concealed conduits as directly as possible and with bend radii as long as possible. Install exposed conduit parallel with or at right angles to building lines. Where conditions permit, maintain continuous exposed horizontal runs along walls at minimum height of 9 feet above floor level or grade.

3.2.3.4 Make elbows, offsets and bends uniform and symmetrical. Bend conduit with approved bending devices.

3.2.3.5 Cut square, ream and remove burrs. Conduit shall be clean, dry, and free of debris. Immediately after installation, plug or cap exposed ends with standard accessories until wires are installed.

3.2.3.6 Use galvanized steel locknuts and insulated bushings for attachment to enclosures except threaded hubs or sealing type locknuts shall be used outdoors or where moisture is present. Threadless fittings will not be permitted for rigid conduit. Use Erickson type couplings where required. Do not use running threads.

3.2.3.7 Use 1 hole clamps equipped with clampbacks or Unistrut with clamps to secure conduits.

3.2.3.8 Install without moisture traps wherever possible. Where practicable, provide drain holes in pullboxes or fittings at low points in raceway systems and remove burrs from drilled holes.

#### 3.2.3.9 Flexible conduit

a. Use to make connections to motors and other equipment subject to vibration. Use liquidtight flexible metal conduit where conduit and fittings are installed outdoors or exposed to moisture or chemical fumes indoors.

b. Use in lengths not exceeding 4 feet for other equipment, with approval of KEH.

3.2.3.10 Set up joints in conduit installed in concrete, underground, or exposed to weather, with high temperature, antiseize, conductive thread lubricant and sealant.

3.2.3.11 Install exposed conduit stubbing up through floor slab straight and plumb, lined up, and uniformly spaced. Install at sufficient depth below slab to eliminate part of bend above top of slab. Cap or plug stub-up before placing concrete. Verify stub-up locations with final equipment arrangements.

3.2.3.12 Wrap conduit passing from concrete to air or to direct earth burial with conduit protection tape from 3 inches in concrete to at least 12 inches in earth, or 3 inches in air, unless conduit is PVC coated.

3.2.3.13 Seal opening around conduit at exterior wall penetrations and penetrations of walls which form boundaries between adjoining ventilation zones, using specified sealant. Make seal waterproof and finish sealant flush with surrounding wall surface.

3.2.3.14 Use hangers with 3/8 inch rods for 2 inch conduit and smaller. If conduit is suspended on rods more than 2 feet long, rigidly brace to prevent horizontal motion or swaying.

3.2.3.15 Apply duct sealing compound after installation of conductors, at boxes, in conduits that penetrate walls or floors.

~~3.2.3.16 Encase conduit installed below on-grade floor slab with minimum 3 inches of concrete on all sides or use PVC-coated rigid steel.~~

~~3.2.3.17 Install PVC-coated conduit in accordance with manufacturer's recommendations. Repair coating, damaged during handling or installation using PVC-paint recommended by conduit manufacturer.~~

#### 3.2.4 Underground Duct Banks

~~3.2.4.1 For single conduit runs, PVC-coated rigid steel conduit shall be used.~~

~~3.2.4.2 Form concrete encasements unless written waiver is obtained from KEH.~~

#### 3.2.5 Boxes, Enclosures and Wiring Devices

3.2.5.1 Install boxes firmly in position and plumb.

3.2.5.2 Install dust covers on junction, pull, and outlet boxes, and other types of wiring outlets at initial installation. Do not remove dust covers until wires are installed and permanent cover or device is placed on box or outlet.

#### 3.2.6 Conductors

3.2.6.1 Maximum pulling tension on conductors: Recommended by manufacturer.

3.2.6.2 Identify each conductor designator by wire number on the Drawings with wire marker. Attach wire marker at each termination point within



2 inches of wire termination. Marker nomenclature shall be visible without moving wire or marker.

3.2.6.3 Paint or pressure-sensitive colored tape may be used for coding conductors instead of colored insulation on #8 AWG and larger wire only. Maintain phase color coding for branch and feeder circuits throughout as follows; A Phase - red, B Phase - yellow or orange, C Phase - blue or black, single-phase ungrounded-black, single-phase second ungrounded leg - red.

3.2.6.4 Use lubricant recommended by cable manufacturer, or wire pulling compound specified, to decrease friction when pulling wire and cable through conduit.

3.2.6.5 Do not install or handle wires with thermoplastic insulation or jacket when ambient temperature is 15 F or below.

3.2.6.6 Direct burial cable shall be placed a minimum of 24 inches belowgrade and laid in a cushion of fine sand not less than 3 inches thick on all sides. A preservative treated 1 inch by 8 inch board shall be placed over the sand before backfill. Six inch wide, yellow plastic marker tape (terra-tape by Griffolyn) shall be placed directly above the cable approximately 12 inches belowgrade. Cable shall be enclosed in conduit a minimum of 3 inches beyond concrete footings. Conduit shall terminate in an insulated bushing and duct seal shall be placed in the end of the conduit to prevent moisture from entering building and to hold cable in the upper half of the conduit. Route of cable shall be marked.

### 3.2.7 Splices, Taps and Cable Terminations

3.2.7.1 Make splices and taps in building wire with solderless connectors described in Paragraph 2.1.1. Use connectors in accordance with manufacturer's instructions.

3.2.7.2 Use plastic insulating tape for uninsulated splices and taps. Apply tape to thickness at least equal to conductor insulation. Where bolted splice or connection presents irregular surface, apply insulating putty to joints before taping.

3.2.7.3 Use crimp-on type ring or spade lugs with turned up legs for wire terminations of stranded conductors to binder screw or stud type terminals. Lugs shall have insulated sleeves.

3.2.8 Lighting Fixtures: Mount suspended lighting fixtures as shown on the Drawings. Use fixture stud if lighting fixture is suspended from outlet box. Only keyless fittings may use box cover fastening screws for support.

3.2.9 Paging System: The amplifier and microphone shall be shelf-mounted near the east door as shown on the Drawing. Conduit containing speaker wires shall terminate in an insulated bushing at the amplifier. Speakers shall be mounted 17'-0" above floor or grade, and shall be connected to an outlet box via portable cord.

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### 3.3 FIELD QUALITY CONTROL

#### 3.3.1 Testing, General

3.3.1.1 Test equipment and wiring for continuity and unintentional grounds, and verify proper phase sequence and voltage at equipment served before attempt is made to operate equipment. Notify KEH before start of tests. Correct items found, during testing or examination by KEH, to be at variance with the Drawings and this Section.

3.3.1.2 Furnish instruments, labor and equipment required to conduct testing.

3.3.1.3 Use test instruments which bear valid calibration stamp showing date of calibration and expiration date of stamp. Calibration and accuracy of test instruments shall be certified by independent testing laboratory having standards traceable to the National Bureau of Standards.

3.3.1.4 In addition to testing specified to be performed by Contractor, installation will be subject to examination by KEH for conformance with design and applicable codes. Assist KEH as requested.

#### 3.3.2 Motors

3.3.2.1 Check for correct rotation.

3.3.2.2 Measure and record voltage and current, and verify value agrees with data on nameplate.

#### 3.3.3 Wiring Systems

3.3.3.1 Megger conductors rated 600 volts and used for services, feeders or branch circuits over 150 volts to ground, phase-to-phase, and phase-to-ground. Minimum acceptable value of insulation resistance is 200 megohms. Megger manufacturer's instruction pamphlet, furnished with megger, shall provide instructions for conducting tests. Disconnect devices not capable of withstanding voltage or current of megger test, such as indicating instruments, relays and lamps, before test is made. Voltage output of megger shall be 1000V dc, nominal.

3.3.3.2 Test wiring operating less than 150 volts to ground for continuity and unintentional grounds. Resistance shall not exceed 1 ohm on continuity checks.

3.3.3.3 Contractor may elect to group and connect together conductors within raceway while performing megger test. Record all readings. Repeat megger test after replacement of defective wiring.

3.3.3.4 Reconnect devices disconnected during testing.

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As-Built Rev 1

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SECTION 16720  
ALARM AND DETECTION SYSTEMS

PART 1 - GENERAL

1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

1.1.1.1 American National Standards Institute (ANSI)

ANSI C80.1-1983

American National Standard for  
Rigid Steel Conduit--Zinc Coated

1.1.1.2 Factory Mutual System (FM)

1989 Edition

Approval Guide

1.1.1.3 National Electrical Manufacturers Association (NEMA)

Standards Publication/  
No. FB 1-1988

Fittings, Cast Metal Boxes,  
and Conduit Bodies for Conduit  
and Cable Assemblies

Standards Publication/  
No. ICS 6-1988

Enclosures for Industrial  
Controls and Systems

1.1.1.4 National Fire Protection Association (NFPA)

NFPA 70

National Electrical Code,  
1990 Edition

NFPA 72A

Standard for the Installation,  
Maintenance and Use of Local  
Protective Signaling Systems for  
Guard's Tour, Fire Alarm and  
Supervisory Service, 1989 Edition

NFPA 72B

Standard for the Installation,  
Maintenance and Use of Auxiliary  
Protective Signaling Systems  
for Fire Alarm Service,  
1986 Edition

NFPA 72E

Standard on Automatic Fire  
Detectors, 1987 Edition

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NFPA 1221

Standard for the Installation,  
Maintenance and Use of Public  
Fire Service Communication  
Systems, 1988 Edition

1.1.1.5 Underwriters Laboratories, Inc (UL)

1989	Electrical Appliance and Utilization Equipment Directory
1989	Electrical Construction Materials Directory
1989	Fire Protection Equipment Directory
UL 38-1981 w/Rev through Sep 1981	Standard for Manually Actuated Signaling Boxes for Use With Fire-Protective Signaling Systems
UL 797-1977	Standard for Electrical Metallic Tubing
UL 1242-1985	Standard for Intermediate Metal Conduit

1.2 SUBMITTALS: Refer to Section 01300 for submittal procedures.

1.2.1 Approval Data: Submit information listed in Column 5 of Approval Data List in this Section if equipment of manufacturer other than as specified.

1.2.2 Vendor Information: Submit information listed in Column 5 of Vendor Information List in this Section.

1.3 QUALITY ASSURANCE

1.3.1 Standards: Products shall be identified for intended purpose by UL in the Electrical Appliance and Utilization Equipment Directory or Electrical Construction Materials Directory, and bear listing mark of laboratory.

1.3.1.1 Use fire alarm equipment listed in UL Fire Protection Equipment Directory or FM Approval Guide bearing mark of listing organization.

1.3.1.2 Fire alarm system design, components, and installation shall meet the requirements of NFPA 70 (NEC), 72A, 72B, 72E and 1221.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

2.1.1 Solderless Connectors: Pressure type, rated for use with copper or aluminum conductors, and used in installations not exceeding 600 volts between conductors. Connectors with insulating caps or covers shall be rated for system utilization voltage. Connectors shall be types specified below.

2.1.1.1 Ideal Industries, Inc "Crimp Connector."

2.1.1.2 Thomas and Betts Company "Sta-Kon."

2.1.1.3 Coaxial cable connectors type PL259 crimp-on.

2.1.2 Raceways, Fittings, and Boxes

2.1.2.1 Conduit shall meet the requirements of appropriate standard as follows.

- |                                     |            |
|-------------------------------------|------------|
| a. Rigid steel                      | ANSI C80.1 |
| b. Intermediate metal               | UL 1242    |
| c. Electrical metallic tubing (EMT) | UL 797     |

2.1.2.2 Conduit fittings for rigid steel and electrical metallic tubing shall meet the requirements of NEMA FB 1. Only compression type threadless fittings shall be used with EMT.

2.1.2.3 Conduit entries into sides or tops of NEMA Type 3 or NEMA Type 3R enclosures shall be made with "Myers" type watertight fittings, or sealing locknuts as manufactured by Midwest Electric Manufacturing Corp.

2.1.2.4 Exterior lighting fixture outlet boxes shall be cast with threaded hubs.

2.1.3 Conductors: Stranded copper, Type THWN/THHN. 120V ac shall be #12 AWG size. 24V dc shall be #14 AWG except radio fire alarm box signalling circuits may be #16 AWG.

2.1.4 Plastic Insulating Tape: Scotch No. 33+ manufactured by 3M Company.

2.1.5 Wire Markers: Thermal printed, heat shrink tube type manufactured by Brady.

2.1.6 Hangers for Individual Conduits: Factory made springable wrought steel clamps or malleable iron, split and hinged rings. For suspended conduit, clamps or rings shall be bolted to, or interlocked with threaded suspension rod.

2.1.7 Fire Alarm Gongs (Mechanical): Single stroke 10 inch diameter bell with universal mounting plate. Gong shall operate on 24V dc, be finished "Signal Red."

2.1.8 Decals: Red with 1/2 inch white letters "FIRE ALARM SYSTEM" with adhesive back as manufactured by Action Industrial Systems.

2.1.9 Fire-Rated Sealant: 3M-CP-25, or Biotherm, one part sealant, UL listed fire barrier sealant manufactured by Bio-Fire Protection Ltd. Prime as recommended by sealant manufacturer.

## 2.2 EQUIPMENT

2.2.1 Fire alarm equipment enclosures shall meet the requirements of NEMA ICS 6-110 and be Type 1.

### 2.2.2 Fire Alarm Control Panel

2.2.2.1 Enclosure shall be designed for surface mounting, with key lockable hinged door. Control panel shall be a Pyrotronics System 3.

2.2.2.2 Provide one fire detection zone, minimum, with end-of-line supervision to detect open circuit or unintentional grounds, in accordance with NFPA 72A.

2.2.2.3 Indicating lights shall be labelled with their function.

2.2.2.4 Supply following panel mounted indicating lights and features:

- a. AC power ON (green).
- b. Low battery (amber).
- c. System fire alarm (red).
- d. System trouble (amber).
- e. Zone alarm (red).
- f. Zone trouble (amber).
- g. Signalling circuit trouble (amber).

h. Alarm gong silence-normal-test switch, with indicating light for silence position (red). Test and silence positions shall not transmit signal to fire station. Ring-back shall occur if panel is reset with gong switch in silence position.



9 2 1 2 3 6 2 1 4 7 2

i. Trouble silence-normal switch, with indicating light for silence position (amber), with ring-back when panel is reset to normal with switch in silence position.

j. Reset-normal-test switch.

k. Trouble alarm buzzer.

l. Two alarm signalling circuits.

m. Fire alarm activating device and circuits.

n. Supervisory activating device and circuits.

o. Automatic power transfer switch.

p. End-of-line supervisory devices.

q. Terminal blocks for wiring.

r. Remote trouble relay with form C contacts.

s. Battery charger.

2.2.2.5 Alarm signals shall latch and require manual reset.

2.2.2.6 Control panel operation.

a. On incoming fire alarm signal, fire alarm activating device shall:

1) Trip existing radio master alarm box by zone.

2) Light fire alarm indicating lamp.

3) Light incoming signal zone indicating light.

4) Operate building alarm gongs.

5) Shut down exhaust fans.

b. On incoming trouble signal, supervisory activating device shall:

1) Light trouble indicating lamp.

2) Light zone indicating lamp.

3) Transmit a trouble signal via the radio master alarm box.

4) Sound audible trouble signal at panel.

c. Fire alarm signal shall be initiated by:

- 1) Operating manual pull station in system.
- 2) Operation of sprinkler head.

d. Trouble signal shall be initiated by:

- 1) Disconnecting device or wire in system.
- 2) Loss of ac circuit.
- 3) Closing of post indicator valve (PIV) or main sprinkler valve.
- 4) Open circuit.
- 5) Ground short not part of system design.
- 6) Removal of modules in fire alarm control panel.
- 7) Low battery voltage.

e. Alarm gong circuit

1) Ringing circuit shall pulse 24V dc single stroke alarm gongs at rate of 2 strokes per second.

2) Circuit components may be in separate enclosure if there is no room in manufacturer's standard enclosure.

2.2.3 Manual Fire Alarm Stations: Noncoded, nonself-restoring double action type with single pole, normally open positive action contacts. Station shall have hinged cover. Stations shall meet the requirements of UL 38, be for indoor surface mounting, and finished "Signal Red"; Pyrotronics Model No. MS-5.

#### 2.2.4 Power Supply

2.2.4.1 The primary power for the Radio Fire Alarm Master Box shall be obtained from the power panelboard as shown on the Drawings. The circuit breaker shall be red, fitted with a suitable guard (requiring the removal of a screw to open) and used only for fire alarm equipment. Label circuits used in the power panelboard.

2.2.4.2 Provide secondary battery operated, power supply with automatic cut-over and return to operate fire alarm system and trouble signals in event of failure of facility power supply. Transfer from facility power supply to secondary power supply shall cause trouble signal to be initiated. No false alarms shall occur due to loss or restoration of primary power.

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2.2.4.3 Provide rechargeable batteries in accordance with NFPA 72B of heavy duty, sealed lead acid gelled electrolyte type battery assembly designed for fire alarm usage. Battery assembly shall be sized to operate system for minimum of 60 hours after loss of charging current.

2.2.4.4 Battery charger: Compatible automatic, solid state, constant voltage device with ac voltage compensation, dc voltage regulation and current limiting.

2.2.5 Radio Fire Alarm Master Box: The radio fire alarm master box and antenna will be furnished by others for installation herunder.

2.2.6 Fire Alarm Locator Lighting Fixture: Locator light No. 332-8N5 outdoor lighting fixture, incandescent, Type N, Crouse-Hinds Vaportight Catalog No. VG175 with VN75 red glass globe, V911 guard, VXF10 outlet box, and 100 watt lamp.

2.2.7 End-Of-Line Resistor or Diode: Sized and provided by fire alarm equipment supplier.

### PART 3 - EXECUTION

#### 3.1 PREPARATION

3.1.1 Field Measurements: The Drawings show general layout of complete system including arrangement of equipment. Verify scale dimensions since actual locations, distances, and levels shall be governed by field conditions.

#### 3.2 INSTALLATION

##### 3.2.1 General

3.2.1.1 Perform work in accordance with NFPA 70 (NEC), 72A, 72B, 72E, and 1221.

3.2.1.2 Fasten equipment to structural members of building or metal supports attached to structure.

a. Attach to existing partitions by screws.

b. Locate equipment, boxes, and conduit approximately where shown in relation to equipment served.

c. Do not install conduit raceways and boxes in positions that interfere with work of other trades.

##### 3.2.2 Conduit

3.2.2.1 Use rigid steel, intermediate metal, or electrical metallic tubing for work described by this project.

3.2.2.2 Install concealed conduits as directly as possible and with bend radii as long as possible. Install exposed conduit parallel with or at right angles to building lines.

3.2.2.3 Make elbows, offsets and bends uniform and symmetrical. Bend conduit with approved bending devices.

3.2.2.4 Use galvanized steel locknuts and bushings for attachment to enclosures except threaded hubs may be used where permitted by the NEC. Threadless fittings will not be permitted for rigid conduit. Use Erickson-type couplings where required. Do not use running threads.

3.2.2.5 Use one-hole clamps equipped with clampbacks to secure conduits.

3.2.2.6 Use "Myers" type watertight fittings for conduit entry to radio fire alarm box.

3.2.2.7 Set up joints in conduit installed in concrete, underground, or exposed to weather, with high temperature, antiseize, conductive thread lubricant and sealant.

3.2.2.8 Seal opening around conduit at exterior wall penetrations and penetrations of walls which form boundaries between adjoining ventilation zones, using specified sealant. Make seal waterproof and finish sealant flush with surrounding wall surface.

### 3.2.3 Boxes, Enclosures, and Wiring Devices

3.2.3.1 Install boxes firmly in position and plumb.

3.2.3.2 Install extension ring with blank cover on flush-mounted junction boxes where box serves permanently installed equipment.

3.2.3.3 Place "FIRE ALARM SYSTEM" decals on all junction boxes.

### 3.2.4 Conductors

3.2.4.1 Do not bend cables installed in wireways to less than manufacturer's recommended minimum bending radius. Bind single conductors installed in wireways with nylon cable ties to form cable assemblies. Lay cables in wireways in straight parallel lines, and avoid crossing.

3.2.4.2 Use following color code for fire alarm system conductors:

<u>Circuit</u>	<u>Color of Wire Insulation</u>
From fire alarm control panel to the radio master alarm box	Orange
Alarm initiating devices-- detectors, manual stations, etc	Red

<u>Circuit</u>	<u>Color of Wire Insulation</u>
Supervisory devices--limit switches, pressure supervisory switches, etc	Yellow
Alarm Bells	Violet
Ground	Green
Other wiring	Different from preceding colors
AC power	Black and White

a. Use colored tape to properly code existing conductors whose color does not comply.

### 3.2.5 Devices

3.2.5.1 Connect wiring to components within the fire alarm control panel in accordance with the Drawing and vendor information prints.

3.2.5.2 Mount manual pull stations at 4'-6" above floor.

3.2.6 Cable Terminations: Use crimp-on type spade lugs for wire terminations of stranded conductors to binder screw or stud type terminals. Spade lugs shall have upset legs and insulation sleeves sized for conductors.

## 3.3 FIELD QUALITY CONTROL

### 3.3.1 Testing, General

3.3.1.1 Test equipment and wiring installed before attempt is made to operate equipment. Resistance, current, and voltage measurements may be made as work progresses. Notify KEH before start of required tests. Correct items found, during testing or examination by KEH to be at variance with the Drawings and Specifications. Deliver test reports to KEH weekly as completed.

3.3.1.2 Initial operation and testing of radio fire alarm box will be performed by Westinghouse Hanford Company (WHC) telecommunications. Do not energize radio fire alarm box until directed to by the WHC telecommunications personnel.

3.3.1.3 Furnish instruments, labor and equipment required to conduct testing.

3.3.1.4 Use test instruments which bear valid calibration stamp showing date of calibration and expiration date of stamp. Calibration and accuracy of test instruments shall be certified by independent testing laboratory having standards traceable to the National Bureau of Standards.

3.3.1.5 In addition to testing specified to be performed by Contractor, installation will be subject to examination by KEH for conformance with design and applicable codes. Assist KEH as requested.

3.3.2 Wiring Systems: Test fire alarm circuits for continuity.

3.3.3 Acceptance Testing: Operability of fire alarm modifications shall be verified by Acceptance Test Procedure (ATP) No. 4745 which is part of the design package.

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As-Built Rev 1

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APPENDIX A

SAMPLE BATTERY CALCULATION

ALARM MANUFACTURER: Fireco  
ALARM PANEL TYPE: Model FACP-7  
REFERENCE DRAWINGS: M123 Control Panel Wiring Diagram  
M374 Zone Alarm Module  
M339 Alarm Trouble Module, etc.

CURRENT DEMAND

SYSTEM COMPONENTS:	NORMAL SUPERVISORY	ALARM CONDITION
Zone Alarm Module	0.005A	0.065A
Trouble Module	0.003A	0.020A or 0.0
Fire Alarm Module	0.005A	0.050A
Ionization Detectors	0.003A	0.035A
Ultraviolet Detectors	0.005A	0.045A
Indicator Lam	-	0.030A
Auxiliary Relay Coil	-	0.025A
Masterbox Coil	-	0.045A

SYSTEM COMPONENTS

NORMAL SYSTEM DEMAND

(6) Zone Alarm Modules	0.030
(1) Trouble Module	0.003
(1) Fire Alarm Module	0.005
(3) Ionization Detectors	0.009
(1) Ultraviolet Detector	0.005
	<u>0.052A @ 60 hr = 3.120AH</u>

SYSTEM COMPONENTS

FIRE ALARM DEMAND

(5) Zone Module (Supervisory)	0.025
(1) Zone Module (Alarm)	0.065
Fire Alarm Module	0.050
(2) Ionization Detectors	0.070
Indicator Lamp	0.030
Aux Relay Coil	0.025
Masterbox Coil	0.045
	<u>0.310A @ 1 hr = 0.310AH</u>

CONTINGENCY - 20% of normal Supr Demand 3.12 AH 0.624AH

TOTAL TIME ADJUSTED CURRENT DRAW: 4.054AH

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APPENDIX 4A-4

CONSTRUCTION SPECIFICATION ER1372-C1, AS-BUILT REV. 0a,  
FOR RADIOACTIVE MIXED WASTE STORAGE PADS

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ER1372-C1  
AS-BUILT REV. 0a

CONSTRUCTION SPECIFICATION FOR  
RADIOACTIVE MIXED WASTE

STORAGE PADS

Original Issue: 03-31-88

Prepared By:

KAISER ENGINEERS HANFORD COMPANY  
Richland, Washington

For the US Department of Energy

Contract DE-AC06-87RL10900

OFFICIAL RELEASE  
BY WHC

DATE MAY 15 1990

23

Sta #10

Client Concurrence

4-19-90  
Date

Project Manager

4/19/90  
Date

Lead Engineer

4/26/90  
4/12/90  
Date

Field Concurrence

4/12/90  
Date

Checked By

4-6-90  
Date

Prepared By

4-6-90  
Date

ECNs affecting specification page attached.

ECN-ER1372-15  
02720-2

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02720-2 and 3

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ER1372-C1

CONSTRUCTION SPECIFICATION FOR  
RADIOACTIVE MIXED WASTE STORAGE PADS

Work Order ER1372

Prepared By:

KAISER ENGINEERS HANFORD COMPANY  
Richland, Washington

For the US Department of Energy

Contract DE-AC06-87RL10900

KFS Work Order 245080

<u>Ronald D. Betchum</u>	<u>3/22/88</u>	<u>A. J. W. [Signature]</u>	<u>3-18-88</u>
Lead Engineer	Date	Specifications Department	Date
<u>C. E. Kennedy</u>	<u>3/22/88</u>	<u>G. K. [Signature]</u>	<u>3/22/88</u>
Safety	Date	Chief Design Engineer	Date
<u>J. E. Breed</u>	<u>3/23/88</u>	<u>Edwin R. [Signature]</u>	<u>3/25/88</u>
Quality Assurance	Date	Project Engineer	Date
WESTINGHOUSE HANFORD COMPANY			
<u>D. E. Palmer</u>			<u>3/31/88</u>
D. E. Palmer, Project Engineer			Date

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## TABLE OF CONTENTS

### Total Pages

#### DIVISION 1 - GENERAL REQUIREMENTS

Section 01010 Summary of Work 2

#### DIVISION 2 - SITEWORK

Section 02200 Earthwork 7

Section 02512 Hot-Laid Asphaltic Concrete Pavement 2

Section 02720 Storm Sewage Systems 3

#### DIVISION 3 - CONCRETE

Section 03300 Cast-In-Place Concrete 5

#### DIVISION 5 - METALS

Section 05500 Metal Fabrications 3

#### DIVISION 6 - WOOD AND PLASTIC

Section 06610 Glass Fiber and Resin Fabrications 2

#### DIVISION 9 - FINISHES

Section 09805 Special Protective Coating 3

Section 09900 Painting 6

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SECTION 01010

SUMMARY OF WORK

PART 1 - GENERAL

1.1 INTRODUCTION

1.1.1 The Radiation Mixed Wastes Storage Pads are to be located in the 200 West Area of the Hanford Site, Richland, Washington.

1.1.2 This specification is for the construction of the complete facility.

1.2 STATEMENT OF WORK

1.2.1 Work Included: The itemization included herein is intended to be broad in scope to identify major elements. The work shall include, but not be limited to, the following:

1.2.1.1 Site work: Truck unloading and drive areas shall be stabilized with gravel.

1.2.1.2 Construction: The work shall include nine curbed concrete slabs-on-grade. Eight of the slabs will be approximately 50 square feet in area and shall have individual rainwater removal systems including drywells. The area around and between these eight slabs shall have a compacted gravel surfacing for truck access.

The other slab will be approximately 9,000 square feet in area with a rainwater removal system consisting of a sloped trench covered with grating, sump, and short run of pipe ending in a drain sump. Access to the slab shall be provided from both Dayton Avenue and the existing storage area to the south.

All slabs shall be coated with a protective coating to provide an impervious containment area.

1.3 SEQUENCE OF WORK

1.3.1 Work must be accomplished in the following sequence to ensure that the coating specified for the concrete slab can be properly applied.

1.3.1.1 Concrete slabs shall be placed first.

1.3.1.2 Special protective coating (SPC) shall be applied to concrete and steel angle curbing.

1.4 SPECIFICATIONS AND DRAWINGS

1.4.1 The Specifications and Drawings which describe the work covered by these Contract Documents are listed in Contract Modification Document.

1.4.2 Five sets of Specifications and Drawings will be furnished to the Contractor without charge.

1.4.3 Refer to Specification W018-C1 for Division 1; General Requirements, Sections 01019 through 01630.

END OF SECTION

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## SECTION 02200

### EARTHWORK

#### PART 1 - GENERAL

##### 1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

###### 1.1.1.1 American Society for Testing and Materials (ASTM)

D 653-86 Standard Terms and Symbols  
Relating to Soil and Rock

D 448-80 Standard Specification for  
Standard Sizes of Coarse Aggregate  
for Highway Construction

###### 1.1.1.2 Washington State Department of Transportation (WSDOT)

M41-10-84 Standard Specifications for  
Road, Bridge, and Municipal  
Construction

1.2 SUBMITTALS: Refer to Specification W018-C1, Section 01300, for  
submittal procedures.

#### PART 2 - PRODUCTS

##### 2.1 MATERIALS

2.1.1 General: Obtain select soils from excavation or other designated  
locations. Obtain onsite approval for soils.

###### 2.1.2 Fill or Backfill

2.1.2.1 Structural: Well-graded soil mixtures which may contain cobbles  
up to 3 inches in greatest dimension if uniformly distributed and not  
constituting more than 20 percent of volume of fill.

2.1.2.2 Common: Well-graded soil mixtures containing cobbles up to 8 inches  
in greatest dimension if uniformly distributed and not constituting more than  
40 percent of volume of fill.

2.1.3 Bedding for Underground Pipe: Sand, defined in ASTM D 653, or  
excavated sandy material having less than 20 percent gravel particles and  
maximum dimension of 1/2 inch.

2.1.4 Base course, subbase and gravel surfacing: Meeting the requirements of WSDOT M41-10, Section 9-03.9(3), Base Course Classification.

2.1.5 Clean Coarse Gravel: Gravel backfill for french drain shall be thoroughly washed and be size number 2 as described in ASTM D 448.

2.1.6 Stabilization: Gravel, defined in ASTM D 653. Maximum size of particles 2 inch minus.

### PART 3 - EXECUTION

#### 3.1 EXCAVATION

3.1.1 Before performing excavation, obtain excavation permit for area to be excavated. Excavation permits will be furnished by the Government upon advance notice of scheduled activity.

3.1.2 Locate and expose underground utilities by hand tools. Use of heavy equipment and machinery is subject to approval of the Government's Representative.

3.1.3 Shore excavations more than 4-feet deep and with sides sloped steeper than 1-1/2 horizontal to 1 vertical. Install shoring as excavation progresses and remove as backfilling is accomplished.

3.1.4 Do not store excavated or other material closer than 2 feet from edge of excavation unless barrier is erected to retain excavated materials. Store and maintain materials in manner that they are prevented from falling or sliding into excavation.

3.1.5 Wherever slopes of excavations will intersect existing underground lines or structures such as building foundations, underground piping, electrical ducts or direct-buried electrical lines, install shoring or other means of support to prevent overstressing existing structure or underground lines or to prevent interrupting service to existing buildings.

#### 3.1.6 Slabs on Grade

3.1.6.1 Make excavations for slabs to depth shown on the Drawings. Make excavations to proper width with allowances made for forms and bracing. Make bottom of excavations compact, level, true, and free of loose material.

3.1.6.2 If over-excavation occurs where slabs are designed to be placed on undisturbed earth, correct at time of placing concrete by placement of backfill, compacted in accordance with Subparagraph 3.2.2.2a.

#### 3.1.7 Drain Sump Excavation

3.1.7.1 Make excavation to the depth and cross-section shown on the Drawing. Make bottom of excavation level and true.

3.1.7.2 If over-excavation occurs, correct by backfilling with gravel stabilization.

### 3.1.8 Trench for PVC Pipe

3.1.8.1 Make excavations to line and grade shown on the Drawings. Trench width shall be 1 foot 4 inches minimum to 2 feet 4 inches maximum. Excavate trench deep enough to permit placement of 4 inch minimum thickness compacted sand bedding except where excavation is in undisturbed sand which will serve as bedding. Pare holes in trench bottom for pipe couplings so pipe will bear full length of barrel.

3.1.8.2 Keep trench free of standing water.

3.1.8.3 If over-excavation occurs correct by placement of structural backfill.

3.1.9 Where stabilization is required, finish subgrade 3 inches below elevations shown on the Drawings.

## 3.2 FILLING AND BACKFILLING

### 3.2.1 General

3.2.1.1 Backfill Permit: Obtain signatures required on backfill permit for area to be backfilled. Forms will be furnished by the Government's Representative. Work not started within 5 calendar days from time permit is approved shall not be started until new permit has been approved. A continuing job that has not had backfill installed within past 5 calendar days will require new backfill permit.

3.2.1.2 Remove debris and organic matter from area to be filled or backfilled.

3.2.1.3 Use only select materials for fill or backfill. Keep materials free of frozen particles, lumps, organic matter, and trash.

3.2.1.4 Do not place fill or backfill on frozen ground.

3.2.1.5 Filling or backfilling by sluicing or flooding with water will not be permitted.

3.2.1.6 Bring fill or backfill up evenly on sides of trenches, structures, and buried pipe to avoid unbalanced loading.

3.2.1.7 Do not place fill or backfill against concrete structure less than 14 days after completion of structure unless written permission from the Government's Representative is obtained.

### 3.2.2 Structural Fill or Backfill

3.2.2.1 Before placement of fill or backfill, demonstrate, to the Government's Representative, by physical test at jobsite, that procedure proposed for installation and compaction of soils will provide degree of compaction specified. Prepare "Soil Compaction Procedure" Form KEH-382 (sample appended) in accordance with printed instructions. Forms will be furnished by the Government's Representative.

3.2.2.2 Place backfill in accordance with WSDOT M41-10, Section 2-03.3(14)C and approved procedures as follows:

- a. Use Method C under slabs and pipelines.
- b. Use Method B under paved areas, and within 5 feet of the unloading pads.

3.2.2.3 Compaction control tests will be in accordance with WSDOT M41-10, Section 2-03.3(14)D.

### 3.2.3 Common Fill or Backfill

3.2.3.1 Place fill or backfill in layers not more than 12-inches thick, loose measurement.

3.2.3.2 Compact each layer, full width, by at least 1 pass of vibratory or rammer-type compactor, pneumatic-tired roller, loaded scraper wheel, grader wheel, or power roller.

3.2.3.3 Mound over top layer of backfill to depth of 1 inch for each 12 inches of trench depth to maximum mound height of 6 inches.

### 3.2.4 Basecourse and Subbase Filling or Backfilling

3.2.4.1 Place and compact subbase in accordance with Subparagraph 3.2.2.2a.

3.2.4.2 Basecourse construction shall be in accordance with the following sections of WSDOT M41-10.

- a. Subgrade preparation: Section 2-06.3.
- b. Equipment: Section 4-04.3(1).
- c. Mixing: Section 4-04.3(3).
- d. Placing and spreading: Section 4-04.3(4).
- e. Miscellaneous requirements: Section 4-04.3(7).
- f. Weather limitations: Section 4-04.3(8).
- g. Hauling: Section 4-04.3(9).



3.2.4.3 Gravel surfacing construction shall be in accordance with the following sections of WSDOT M41-10:

- a. Subgrade preparation: Section 2-06.3.
- b. Placing and spreading: Section 4-04.3(4).
- c. Shaping and compacting: Section 4-04.3(5).

### 3.2.5 Filling or Backfilling for PVC Pipe

3.2.5.1 Place and compact sand bedding beneath pipe as specified for structural backfill.

3.2.5.2 Place backfill over joints only after leak test has been completed.

3.2.5.3 Backfill around pipe and to 12 inches above pipe with sand material compacted as specified for structural backfill. Backfill remainder of trench with common backfill.

### 3.2.6 Filling for Drain Sump

3.2.6.1 Place 3 inch minimum layer of gravel stabilization on bottom and sides of sump.

## 3.3 FINISH GRADING AND STABILIZATION

3.3.1 Rake area disturbed by work, remove surface stones larger than 6 inches, and dispose of excess material and debris at area designated by the Government's Representative.

3.3.2 Stabilize area indicated on Drawings with 2-inch course of gravel meeting the requirements of Paragraph 2.1.6. Finish stabilization course to elevations shown on the Drawings.

## 3.4 FIELD QUALITY CONTROL

3.4.1 Soil Compaction Tests: Sampling and testing of compacted fill and backfill will be performed by the Government's Representative.

# SOIL COMPACTION PROCEDURE

<b>A</b>	Project No.	Project Title			Date		
	Contract No.	Procedure No.		Location of Demonstration			
	REQUIREMENTS				EQUIPMENT DEMONSTRATED		
	Applicable Spec./Dwg.				Type		
	Compaction Required %				Manufacturer		
	Maximum Lift Size				Model		
<b>B</b>	LABORATORY SOIL TEST RESULTS						
	<input type="checkbox"/> Non-granular Materials (WSDOT Test Method No. 609)				<input type="checkbox"/> Granular Materials (WSDOT Test Method No. 606-A)		
<b>C</b>	COMPACTION DEMONSTRATION TEST RESULTS						
	Formula for Percent Compaction: $\frac{\text{dry density}}{\text{max density}} \times 100 = \text{Percent Compaction}$						
	No. of Passes	Depth of Lift	Percent Moisture	Lbs/ft <sup>3</sup> Dry	Maximum Density	Percent Compaction	Accept
Observations or Comments							
TEST METHOD USED FOR DEMONSTRATION <input type="checkbox"/> Nuclear Gage (ASTM D2922 & D3017) <input type="checkbox"/> Sand Cone (ASTM D1556) <input type="checkbox"/> Other _____							
Apparatus No. _____							
<b>D</b>	Contractor Representative					Date	
	Government Representative					Date	

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## INSTRUCTIONS

This Soil Compaction Procedure form, when approved by the Government Representative, constitutes an approved compaction procedure.

Section A is the responsibility of the Construction Contractor. It is to be completed at the time of backfill compaction demonstration and presented to the Government Representative.

Section B is completed by the Government Representative. Data entered is obtained from the agency that performs the laboratory testing.

Section C is completed by the Government Representative as the demonstration is performed. Using the applicable formula, the percent compaction achieved is determined and entered. Acceptance is based on the results as compared with the compaction percent required in Section A.

Section D is signed and dated by the Construction Contractor Representative acknowledging responsibility for this procedure and compliance thereto for applicable backfill operations. Section D is signed and dated by the Government Representative to signify approval.

END OF SECTION

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SECTION 02512  
HOT-LAID ASPHALTIC CONCRETE PAVEMENT

PART 1 - GENERAL

1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

1.1.1.1 American National Standards Institute (ANSI)

ANSI D6.1-1978, w/Rev  
through Dec 1983

American National Standard Manual  
on Uniform Traffic Control Devices  
for Streets and Highways

1.1.1.2 Washington State Department of Transportation (WSDOT)

M41-10-84

Standard Specification for Road,  
Bridge, and Municipal Construction

1.2 SUBMITTALS: Refer to Specification W018-C1, Section 01300, for submittal procedures.

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 Asphalt: Meeting the requirements of WSDOT M41-10, Sections 9-02.1(2) and 9-02.1(4). Grade of paving asphalt for use in asphaltic concrete mixture shall be AR-4000-W unless directed otherwise by the Government's Representative. Grade of liquid asphalt for prime coat shall be MC-250.

2.1.2 Aggregate: Class "B" meeting the requirements of WSDOT M41-10, Section 9-03.8(1), (2), (3)B.

2.1.3 Blending Sand: Meeting the requirements of WSDOT M41-10, Section 9-03.8(4).

2.1.4 Mineral Filler: Meeting the requirements of WSDOT M41-10, Section 9-03.8(5).

2.2 MIXES

2.2.1 Proportioning of Asphalt Concrete Materials: Meeting the requirements of WSDOT M41-10, Section 9-03.8(6) Class "B" asphalt concrete.

PART 3 - EXECUTION

3.1 INSTALLATION

3.1.1 Construction: In accordance with following sections of WSDOT M41-10.

3.1.1.1 Asphalt mixing plants: Section 5-04.3(1).

3.1.1.2 Hauling equipment: Section 5-04.3(2).

3.1.1.3 Asphalt pavers: Section 5-04.3(3).

3.1.1.4 Rollers: Section 5-04.3(4).

3.1.1.5 Asphalt material heating: Section 5-04.3(6).

3.1.1.6 Aggregate preparation: Section 5-04.3(7).

3.1.1.7 Mixing: Section 5-04.3(8).

3.1.1.8 Spreading and finishing: Section 5-04.3(9).

3.1.1.9 Compaction: Section 5-04.3(10).

3.1.1.10 Joints: Section 5-04.3(11).

3.1.1.11 Samples: Section 5-04.3(12).

3.1.1.12 Surface smoothness: Section 5-04.3(13).

3.1.1.13 Heating-planing bituminous pavement: Section 5-04.3(14).

3.1.1.14 Weather limitations: Section 5-04.3(16).

3.1.1.15 Asphalt change in grade: Section 5-04.3(18).

3.1.1.16 Driving surface sealing: Section 5-04.3(19).

3.1.2 Construct shoulders of the width shown on the Drawings, after placement of the asphalt wearing course. Material shall be the same as used for base course.

3.2 FIELD QUALITY CONTROL

3.2.1 Sampling and testing will be performed by the Government's Representative.

3.3 PROTECTION

3.3.1 Traffic Control: Institute and maintain in accordance with WSDOT M41-10, Section 1-07.23, Subsections (1) through (4).

END OF SECTION

SECTION 02720  
STORM SEWAGE SYSTEMS

PART 1 - GENERAL

1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

1.1.1.1 American National Standards Institute (ANSI)

ANSI Z53.1-1979

American National Standard Safety  
Color Code for Marking Physical  
Hazards

1.1.1.2 American Society for Testing and Materials (ASTM)

C 118-83

Standard Specification for  
Concrete Pipe for Irrigation or  
Drainage

D 2665-85

Standard Specifications for  
Poly (Vinyl Chloride) (PVC)  
Plastic Drain, Waste, and Vent  
Pipe and Fittings

1.1.1.3 Federal Specifications (FS)

RR-C-271C

Chains And Attachments, Welded  
And Weldless

RR-F-221/3A

Fence Posts And Accessories  
(Detail Specification)

TT-E-489G

Enamel, Alkyd, Gloss (For Exterior  
And Interior Surfaces)

1.2 SUBMITTALS: Refer to Specification W018-C1, Section 01300, for  
submittal procedures.

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 Clean Coarse Gravel: See Section 02200.

2.1.2 Filter Fabric: Mirafi 140S manufactured by Mirafi, Inc.

2.1.3 Drainage Piping

2.1.3.1 Duriron Type MJ with mechanical joints and fittings as shown on the Drawings and manufactured by the Duriron Co.

2.1.3.2 PVC pipe: Schedule 40 pipe and fittings meeting the requirements of ASTM D 2665 or 3034 with solvent cement joints or "BAND IT" no hub coupling joints.

ECN-15  
ECN-15

2.1.4 Drainage Structures: Nonreinforced concrete pipe meeting the requirements of ASTM C 118, heavy-duty.

2.1.5 Chain Barricade

2.1.5.1 Posts: Meeting the requirements of FS RR-F-221/3, minimum 6 feet long, and designed for driving into earth. Clean and paint with 2 coats of yellow enamel meeting the requirements of FS TT-E-489, Class A.

2.1.5.2 Chain: Trade No. 10 galvanized steel jack Type II meeting the requirements of FS RR-C-271.

2.1.5.3 Signs: Galvanized steel plate painted with 2 coats of yellow enamel. Signs shall state "DRAIN SUMP" in 1 inch high black letters.

PART 3 - EXECUTION

3.1 INSTALLATION

3.1.1 Storm Sewers

3.1.1.1 Install piping in accordance with the Drawings and this Section.

3.1.1.2 Trenching and backfilling for underground pipe shall be in accordance with Section 02200.

3.1.1.3 Keep piping systems clean during work.

3.1.1.4 Where piping is laid in trench, trench shall be free of frost or frozen earth or standing water.

3.1.1.5 Protect PVC and concrete pipe from impact shocks and dropping. Before installation inspect and discard damaged sections.

3.1.2 Drywells: Install drywells in accordance with the Drawings.

3.1.3 Drain Sump: Construct drain sump in accordance with the Drawings and Section 02200.



3.1.4 Hydrostatic Testing

3.1.4.1 Test PVC pipe as follows:

- a. ~~Provide temporary cap at low end of 4 inch PVC pipe drain line.~~ ECN-01  
*Provide test cap at low end of 4 inch PVC pipe drain line.* ECN-01

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b. Fill pipe and sump with water and allow to stand for 30 minutes with no visible leaks or loss of test water.

c. Examine joints, fittings, and other potential leak sources. Repair detectable leaks and retest.

3.1.4.2 Test Duriron pipe as follows:

a. Install cleanout plug.

b. For storage slab test Duriron pipe after testing PVC pipe. Fill pipe and trench with water and allow to stand for 30 minutes with no visible leaks or loss of test water.

c. For loading pad fill containment area with water to top of curb and allow to stand for 30 minutes with no visible leaks or loss of test water.

d. During b and c above examine joints *and caps*, ~~fittings~~, ~~and other potential leak sources~~. Repair detectable leaks and retest.

ECN-01

ECN-01

3.1.5 Install chain barricade posts plumb and true at 20 foot maximum spacing. Install chain on posts. Mount signs on posts; one sign at each end of trench and two on each side, equally spaced.

3.1.6 Install drywell guard posts as shown on the Drawing. Prepare surface and paint in accordance with Section 09900. Paint entire length of each post with primer and above ground portion with two coats of yellow enamel. Yellow color is defined in ANSI Z53.1.

END OF SECTION

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## SECTION 03300

### CAST-IN-PLACE CONCRETE

#### PART 1 - GENERAL

##### 1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

##### 1.1.1.1 American Concrete Institute (ACI)

ACI 301-84 (Revised 1985)      Specifications for Structural  
Concrete for Buildings

ACI 305R-77 (Revised 1982)      Hot Weather Concreting

ACI 306-1-87      Standard Specification for Cold  
Weather Concreting

##### 1.1.1.2 American Society for Testing and Materials (ASTM)

A 185-85      Standard Specification for Steel  
Welded Wire Fabric, Plain, for  
Concrete Reinforcement

A 615-86      Standard Specification for  
Deformed and Plain Billet-Steel  
Bars for Concrete Reinforcement

C 94-86b      Standard Specification for  
Ready-Mixed Concrete

##### 1.1.1.3 National Ready Mixed Concrete Association (NRMCA)

January 1, 1976      Certification of Ready Mixed  
(Third Revision)      Concrete Production Facilities

1.2 SUBMITTALS: Refer to Specification W018-C1, Section 01300, for  
submittal procedures.

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 Concrete

2.1.1.1 Furnish 4,000 psi concrete, pre-approved ACME No. 6452, ACME Concrete Company.

2.1.1.2 Mixing: In accordance with ASTM C 94.

2.1.1.3 Delivery: In accordance with ASTM C 94.

2.1.2 Reinforcing Steel

2.1.2.1 Steel bars: ASTM A 615, deformed, Grade 60.

2.1.2.2 Welded wire fabric: ASTM A 185.

2.1.2.3 Tie wire: Black annealed steel, 16 gauge minimum.

2.1.3 Forms: Wood, steel, plywood, or Masonite Corporation "Concrete Form Presdwood," as required for various specified finishes.

2.1.4 Construction joint and control joint materials.

2.1.4.1 Sealant: See Section 09805.

2.1.5 Nonshrink Grout

2.1.5.1 Nonmetallic type: "Five Star Grout" by US Grout Corp; "Por-Rok" Anchoring Cement by Hallemite; or "Masterflow 713" by Master Builders.

PART 3 - EXECUTION

3.1 PREPARATION

3.1.1 Form Construction

3.1.1.1 Install formwork in accordance with ACI 301, Section 4.2. Interior shape and rigidity shall be such that finished concrete will meet the requirements of the Drawings within tolerances specified in ACI 301, Table 4.3.1.

3.1.1.2 Prepare form surfaces in accordance with ACI 301, Section 4.4.

3.1.1.3 Forms for surfaces which will be permanently concealed from view may be saturated with water before placing concrete instead of other treatment, except in freezing weather forms shall be treated with oil or stearate.

3.1.1.4 Clean forms of foreign material before placing concrete.

## 3.2 INSTALLATION

### 3.2.1 Reinforcing Steel

3.2.1.1 Fabricate reinforcing bars accurately to dimensions shown on Drawings, within tolerances shown in ACI 301, Section 5.4.

3.2.1.2 Tag steel in accordance with Bar List.

3.2.1.3 Place reinforcing steel as shown or noted on the Drawings within tolerances specified in ACI 301, Sections 5.4 and 5.5.

3.2.1.4 Tie bars to prevent displacement during placement of concrete.

3.2.1.5 Do not force reinforcing bars into concrete after initial set has started.

3.2.1.6 Place reinforcing with dimension of concrete protection equal to minimum given in ACI 301, Section 5.5, except where shown otherwise on the Drawings.

3.2.1.7 Place welded wire fabric on chairs and lap two mesh at splices. Tie splices with wire.

### 3.2.2 Concrete

3.2.2.1 Before ordering concrete, obtain approval of required submittals.

3.2.2.2 Before concrete is batched, obtain approval of formwork and reinforcement by the Government's Representative.

3.2.2.3 Before placing concrete:

a. Obtain approval of "Pour Slip" by the Government's Representative. "Pour Slip" shall include appropriate reference to specific portion of structure to be placed, maximum size of coarse aggregate, design strength, admixture, and slump. "Pour Slip" forms can be obtained from the Government's Representative.

b. For each truck load of concrete, deliver "Trip Ticket" to the Government's Representative. "Trip Ticket" shall contain information listed in ASTM C 94, Subparagraphs 16.1.1 through 16.1.10, and include water/cement ratio.

3.2.2.4 Place concrete in accordance with ACI 301, Sections 8.1, 8.2, and 8.3. Do not drop (free fall) more than 5 feet. Insert vibrator (vertically if possible) into concrete and reach small distance into concrete in next lower layer. Do not insert vibrators into lower courses that have reached initial set. Take care to avoid allowing head of vibrator to come in contact with forms or embedded items.

3.2.2.5 Temper concrete only as permitted in ACI 301, Section 7.5.

3.2.2.6 Construction joints: Make construction joints in accordance with ACI 301, Section 6.1, and as detailed on the Drawings.

3.2.2.7 Embedded items: Install embedded items in accordance with ACI 301, Sections 6.4 and 6.5.

3.2.2.8 Placing concrete against earth: Place on or against firm, damp surfaces free of frost, ice, and free water. Do not place until required compaction has been obtained. Dampen earth surfaces to receive fresh concrete.

3.2.2.9 Consolidation: Consolidate concrete slabs in accordance with ACI 301, Section 11.6.

### 3.2.3 Concrete Repair and Form Removal

3.2.3.1 Form removal: Remove in accordance with ACI 301, Section 4.5.

3.2.3.2 Cut back form ties and examine concrete surfaces for defects. Repair only after permission for patching is given by the Government's Representative.

3.2.3.3 Place concrete repair mortar within one hour after mixing. Do not retemper mortar.

3.2.3.4 Surface defect repair: Repair in accordance with ACI 301, Sections 9.1, 9.2; and 9.3. Cure concrete repairs same as new concrete.

### 3.2.4 Concrete Finishes and Tolerances

3.2.4.1 Formed surfaces: Start finishing following concrete repair and complete within 96 hours after forms have been removed. Finish in accordance with sections of ACI 301 noted below:

- |   |                |
|---|----------------|
| a. Surfaces exposed to earth backfill             | Section 10.2.1 |
| b. Exterior surfaces exposed to weather           | Section 10.2.2 |
| c. Related unformed surfaces                      | Section 10.5   |
| d. Surfaces to receive special protective coating | Section 10.3.1 |

3.2.4.2 Unformed surfaces: Finish in accordance with sections of ACI 301 noted below:

- |   |                |
|---|----------------|
| a. Exterior slabs to receive special protective coating | Section 11.7.4 |
|---|----------------|

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### 3.3 FIELD QUALITY CONTROL

3.3.1 Concrete Testing: Sampling and testing of concrete will be the responsibility of the Government's Representative. Concrete will be tested in accordance with ACI 301, Sections 16.3.4, 16.3.5, 16.3.6, and 16.3.8.

### 3.4 CURING AND PROTECTION

#### 3.4.1 Curing

3.4.1.1 Cure concrete in accordance with ACI 301, Section 12.2. Clear curing compounds shall be tinted or applied surfaces marked to delineate extent of spraying.

3.4.1.2 Do not use curing compound on concrete surfaces to receive special protective coating.

#### 3.4.2 Protection

3.4.2.1 Cold weather: Maintain concrete at a temperature of at least 50 F for 72 hours after it is placed. Protect concrete from freezing and rapid temperature drop for not less than four days, in accordance with ACI 306R.

3.4.2.2 Hot weather: Protect exposed concrete surfaces from drying during placement in accordance with ACI 305R. Finish and maintain exposed surfaces wet continuously until the specified curing is commenced.

3.4.2.3 Protection from mechanical injury: During the curing period, the concrete shall be protected from damaging mechanical disturbances, particularly load stresses, shock, and excessive vibration. All finished concrete surfaces shall be protected from damage caused by construction equipment, materials, methods, and by rain or running water. Structures shall not be loaded in such a way as to overstress the concrete.

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SECTION 05500  
METAL FABRICATIONS

PART 1 - GENERAL

1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

1.1.1.1 American Society of Mechanical Engineers (ASME)

1986 Edition, w/Addenda  
through Dec 1987

ASME Boiler and Pressure Vessel  
Code

Section IX

Qualification Standard for Welding  
and Brazing Procedures, Welders,  
Brazers, and Welding and Brazing  
Operators

1.1.1.2 American Society for Testing and Materials (ASTM)

A 36-84a

Standard Specification for  
Structural Steel

A 53-86

Standard Specification for Pipe,  
Steel, Black and Hot-Dipped,  
Zinc-Coated Welded and Seamless

1.1.1.3 American Welding Society (AWS)

AWS D1.1-86

Structural Welding Code - Steel

1.2 SUBMITTALS: Refer to Specification W018-C1, Section 01300, for  
submittal procedures.

1.3 QUALITY ASSURANCE

1.3.1 Qualification of Welding Personnel and Procedures

1.3.1.1 Personnel and procedures for welding structural steel shall have  
been qualified in accordance with AWS D1.1 before welding. Qualification in  
accordance with ASME Section IX may be substituted for this requirement.

1.3.1.2 Maintain file of welding procedure specifications, procedure  
qualification records, and welder performance qualification test results at  
jobsite for review by the Government's Representative.

#### 1.4 DELIVERY, STORAGE, AND HANDLING

1.4.1 Deliver metal fabrications to jobsite at time convenient for installation. If exposed to inclement weather, protect fabrications with paper, plastic, or other weatherproof covering and store off ground.

#### PART 2 - PRODUCTS

##### 2.1 MATERIALS

2.1.1 Rolled Steel Shapes, Plates, and Bars: ASTM A 36.

2.1.2 Steel Pipe: ASTM A 53, black, standard weight, Schedule 40.

2.1.3 Fasteners

2.1.3.1 Weld studs: Nelson Stud Welding Company type H4L.

2.1.4 Paint: See Section 09900.

##### 2.2 FABRICATION

###### 2.2.1 General

2.2.1.1 Verify measurements and take field measurements necessary before fabrication. Provide miscellaneous bolts and anchors, supports, braces, and connections necessary for completion of metal fabrications. Cut, reinforce, drill, and tap metal fabrications shown to receive finish hardware and similar items. Weld or bolt connections as shown on the Drawings.

2.2.1.2 Workmanship: Form metal fabrications to shape and size, with sharp lines, angles, and true curves. Drilling and punching shall produce clean, true lines and surfaces. Execute and finish work in accordance with Fabrication Drawings.

2.2.1.3 Jointing and intersections: Accurately made, tightly fitted, and in true planes with adequate fastenings.

2.2.1.4 Perform welding of steel connections in accordance with AWS D1.1, using E70XX electrodes.

2.2.2 Guard Posts: Fabricate using steel pipe in accordance with the Drawings.

2.2.3 Miscellaneous Steel Items: Supply required clips, frames, equipment supports, and other fabrications as shown on the Drawings. Fabricate parts from standard structural sections or shapes, to sizes required. Wherever miscellaneous parts are exposed, grind edges, corners, and rough cuts smooth and free of snags. Shop paint parts except those to be embedded in concrete or masonry, or those which require other specific finishes.

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2.2.4 Finishes: Prime ferrous metal in accordance with Section 09900 unless specified otherwise in Section 09805. Do not coat members to be embedded in concrete or masonry, surfaces and edges to be field welded, or items to be galvanized.

### PART 3 - EXECUTION

3.1 INSPECTION: Examine areas where metal fabrications are to be installed and notify the Government's Representative in writing of conditions detrimental to proper and timely completion of work. Do not proceed with work until unsatisfactory conditions have been corrected in manner compatible with requirements for installation. Furnish setting drawings, diagrams, templates, instructions, and directions for installation of anchorages, such as concrete inserts, anchor bolts, and miscellaneous items having integral anchors, to be embedded in concrete or masonry construction. Coordinate with the Government's Representative for delivery of items to jobsite.

### 3.2 INSTALLATION

3.2.1 Install metal fabrications plumb, level, or as shown on the Drawings.

3.2.2 Make field connections as neatly as possible with joints flush and smooth. Grind smooth exposed field welds and polish before field painting.

3.2.3 After installation has been approved, clean and paint connections with primer. Touch-up shop prime coat wherever damaged.

END OF SECTION

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SECTION 06610

GLASS FIBER AND RESIN FABRICATIONS

PART 1 - GENERAL

1.1 SUBMITTALS: Refer to Specification W018-C1, Section 01300, for submittal procedures.

1.2 DELIVERY, STORAGE, AND HANDLING

1.2.1 Deliver fabrications to project at time convenient for installation. If exposed to inclement weather, protect with paper, plastic or other weatherproof covering and store off ground.

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 Glass Fiber Reinforced Grating: Composition to be vinyl ester resin type. Grating shall be coated or contain additive to provide resistance to ultraviolet degradation. Grating shall have anti-slip grit type surface, be size shown on the Drawings, and be Duradek Standard Fiberglass Grating by AFC, Inc.

2.2 FABRICATION

2.2.1 General: Verify measurements and take field measurements necessary before fabrication.

2.2.2 Workmanship: Form fabrications to indicated shape and size, with sharp lines and angles. Drilling and punching shall produce clean, true lines and surfaces. Execute and finish work in accordance with fabrication drawings.

2.2.3 Intersections shall be accurately made, tightly fitted and in true planes.

PART 3 - EXECUTION

3.1 INSPECTION

3.1.1 Examine areas and conditions under which glass fiber and resin fabrications are to be installed and notify the Government's Representative in writing of conditions detrimental to proper and timely completion of work. Do not proceed with work until unsatisfactory conditions have been corrected in manner compatible with requirements for installation.

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3.2 INSTALLATION

3.2.1 Install fabrications as shown on the Drawings.

3.2.2 Make field connections as neatly as possible with joints flush and smooth.

END OF SECTION

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SECTION 09805  
SPECIAL PROTECTIVE COATING

PART 1 - GENERAL

1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

1.1.1.1 Steel Structures Painting Council (SSPC)

Surface Preparation Specifications

SSPC-SP 6-85

No. 6 Commercial Blast Cleaning

1.2 SUBMITTALS: Refer to Specification W018-C1, Section 01300, for submittal procedures.

1.3 DELIVERY, STORAGE, AND HANDLING

1.3.1 Deliver materials to jobsite in manufacturer's unopened containers with labels intact. Do not open containers or remove labels until after inspection and acceptance by the Government's Representative.

1.3.2 Store materials in accordance with manufacturer's written instructions and in well ventilated area not exposed to excessive heat, sparks, flame, or direct rays of sun.

1.4 PROJECT CONDITIONS

1.4.1 Environment for Coating: Coat exterior surfaces only when ambient and surface temperatures are between 50 F and 120 F, and temperature is 5 F above dewpoint. Coating should not be applied if rain is anticipated within 4 hours of application.

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 The materials for the coating system shall be manufactured by United Coatings and supplied by Northwest Specialty Paint and Coatings as follows:

2.1.1.1 Basecoat and topcoat: Uniflex 455.

2.1.1.2 Concrete sealer: Uniflex Sealer 100.

2.1.1.3 Primer for ferrous metals: Primer 302.

- 2.1.1.4 Joint sealant: Uniflex Sealant 200.
- 2.1.1.5 Material for non-skid texture: Walnut shell aggregate.

PART 3 - EXECUTION

3.1 INSPECTION

3.1.1 Examine surfaces scheduled to receive paint and finishes for conditions that will adversely affect execution, permanence, or quality of work and which cannot be put into acceptable condition through preparatory work included in Article 3.2.

3.1.2 Report in writing to the Government's Representative conditions that may potentially affect proper application of finish. Do not commence surface preparation or coating application until defects have been corrected and conditions are made suitable.

3.2 PREPARATION

3.2.1 General

3.2.1.1 Before application, power vacuum space or area to receive coating.

3.2.2 Pre-Priming

3.2.2.1 Prepare ferrous metals and concrete surfaces in accordance with SSPC-SP 6 Commercial Blast Cleaning. Remove abrasive residue and dust, and prime metal within four hours after preparation.

3.2.2.2 Allow concrete to cure 28 days before coating is applied.

3.2.3 Post Priming

3.2.3.1 Feather abrasions, chips, skips, and holidays occurring in prime coat by sanding and recoat with material and color to minimum dry film thickness specified.

3.2.3.2 Coated surfaces may be recoated as soon as previous coats have dried sufficiently to allow walking upon by applicator.

3.2.3.3 Protect coating from rain until dry to touch.

3.2.4 Protection

3.2.4.1 Provide and install drop cloths, shields, and other protective devices required to protect surfaces adjacent to areas being coated. Keep spatter, smears, droppings, and overrun of coating materials to minimum and remove as coating work progresses.



### 3.3 APPLICATION

3.3.1 Apply coating materials and walnut shell aggregate non-skid texturing in accordance with manufacturer's written instructions. Uniflex 455 shall be applied and cured in temperatures of 50 F or warmer.

3.3.2 Apply with equipment recommended by manufacturer.

3.3.3 Fill all construction and control joints within curbed area with Uniflex Sealant 200 in accordance with manufacturer's written instructions.

### 3.4 FIELD QUALITY CONTROL

3.4.1 Government Inspection: The Government's Representative will perform tests to ascertain that coating materials have been applied in accordance with this Section.

### 3.5 CLEANING

3.5.1 Furnish and maintain at jobsite, closed metal containers for disposal of waste materials. Place materials spotted or soaked with paint, oil, or solvents in containers.

3.5.2 Brushes, rollers, spatulas, and spray equipment shall be thoroughly cleaned after each use and shall contain no oils, thinners, or other residue after such cleaning.

3.5.3 Remove empty cans from jobsite at end of each shift.

3.5.4 At completion of coating work, remove materials, containers, rags, cloths, brushes, and other equipment from jobsite. Clean up spills.

### 3.6 COATING SCHEDULE

3.6.1 Concrete and Ferrous Metals:

	<u>Sq Feet Per Gallon</u>	<u>Min. Wet Film Thick.</u>	<u>Minimum Dry Film Thickness</u>
Primer: Primer 302 (metal)	250-300		
Primer: Uniflex Sealer 100 (concrete)	250		
Second: Uniflex 455 (basecoat)		20 mils	14 mils
Third: Uniflex 455 (basecoat)		20 mils	14 mils
Fourth: Uniflex 455 (topcoat)		20 mils	14 mils

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## SECTION 09900

### PAINTING

#### PART 1 - GENERAL

##### 1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

##### 1.1.1.1 American Society for Testing and Materials (ASTM)

D 16-84	Standard Definitions of Terms Relating to Paint, Varnish, Lacquer, and Related Products
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##### 1.1.1.2 Federal Specifications (FS)

TT-E-489G	Enamel, Alkyd, Gloss (For Exterior And Interior Surfaces)
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TT-P-641G, Including AMD 1	Primer Coating; Zinc Dust-Zinc Oxide (For Galvanized Surfaces)
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TT-P-645A	Primer, Paint, Zinc Chromate, Alkyd Type
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##### 1.1.1.3 Military Specification (MS)

DOD-P-15328D, Including AMD 1	Primer (Wash), Pretreatment (Formula No. 117 For Metals)
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##### 1.1.1.4 Steel Structures Painting Council (SSPC)

Surface Preparation Specifications

SSPC-SP 2-82	No. 2 Hand Tool Cleaning
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SSPC-SP 3-82	No. 3 Power Tool Cleaning
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1.2 SUBMITTALS: Refer to Specification W018-C1, Section 01300, for submittal procedures.

##### 1.3 DELIVERY, STORAGE, AND HANDLING

1.3.1 Deliver materials to jobsite in sealed, original, labeled containers, each bearing manufacturer's name, type of paint, brand name, color designation, and instructions for mixing and reducing.

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1.3.2 Store materials at minimum ambient temperature of 45 F in well ventilated and heated area or areas.

1.3.3 Take precautions to prevent fire hazards and spontaneous combustion.

#### 1.4 PROJECT CONDITIONS

##### 1.4.1 Environmental Requirements

###### 1.4.1.1 Temperature

a. Unless otherwise recommended by paint manufacturer, apply coatings when ambient and surface temperatures are between 45 F and 95 F except water-thinned paints and other special coatings. Apply water-thinned paints when ambient and surface temperature is between 50 F and 90 F.

b. Should temporary heat be required, provide until specified surface and air temperatures exist for required time period. Maintain temporary heat for 24 hours after paint and finish application.

###### 1.4.1.2 Weather

a. Do no exterior work on unprotected surfaces if it is raining or moisture from other source is present, or expected before applied paints can dry or attain proper cure without damage.

b. Allow wet surfaces to dry and attain required temperatures and conditions specified before proceeding with work, or continuation of previously started work.

c. Do not apply finish in areas where dust is being generated.

1.4.1.3 Ventilation: Provide adequate continuous ventilation required for drying various materials as recommended by paint manufacturer.

1.4.1.4 Illumination: Do not proceed with work unless minimum lighting level of 15 foot-candles is provided on surfaces to be painted or finished. Provide temporary lighting to attain lighting level specified.

#### PART 2 - PRODUCTS

##### 2.1 MATERIALS

2.1.1 Terms used are defined in ASTM D 16.

###### 2.1.2 Sealers

2.1.2.1 Concrete slabs: Refer to Section 09805.

2.1.3 Primers

2.1.3.1 Zinc chromate: FS TT-P-645, (alkyd type). Tint with lamp black to produce color other than yellow.

2.1.3.2 Zinc dust-zinc oxide: FS TT-P-641, Type II.

2.1.4 Paints

2.1.4.1 Gloss enamel, exterior: FS TT-E-489, Class A.

2.1.5 Other Materials: Materials not specifically described but required to achieve specified finishes shall be of high quality and of manufacture approved by the Government's Representative.

2.1.6 Special Protective Coatings: See Section 09805.

2.1.7 Hazardous Material Restrictions: Do not use mercurial fungicides in exterior oil paints.

2.1.8 Colors and Tints: Paint manufacturer's standard colors and tints.

PART 3 - EXECUTION

3.1 INSPECTION

3.1.1 Examine surfaces scheduled to receive paint and finishes for conditions that will adversely affect execution, permanence or quality of work and which cannot be put into acceptable condition through preparatory work included in Article 3.2.

3.1.2 Report in writing to the Government's Representative conditions that may potentially affect proper application of finish. Do not commence surface preparation or coating application until defects have been corrected and conditions are made suitable.

3.2 PREPARATION

3.2.1 New Surface

3.2.1.1 Surfaces to be coated shall be in proper condition to accept, and assure proper adhesion of coating system.

3.2.1.2 Ferrous metals

a. For shop primed surfaces, apply phosphoric acid etch solution at field welded or abraded spots and let set for time recommended by acid etch manufacturer, rinse with potable water, and when dry, apply prime coat. Wash primed surfaces free of dirt, oil, and grease.

b. Prepare ferrous metals in accordance with SSPC-SP 2 Hand Tool Cleaning and/or SSPC-SP 3 Power Tool Cleaning. Mill scale may be present on cleaned surface providing it is fully anchored, gives metallic appearance and does not cover more than 30 percent of surface. Prime ferrous metals within four hours after preparation.

3.2.1.3 Galvanized metals: Remove surface contamination, wash metal with phosphoric acid or approved solution, (or) apply one coat of etching type primer.

### 3.2.2 Mixing and Thinning

3.2.2.1 General: Packaged paint may be thinned before application where necessary to suit conditions of surface, temperature, weather, and method of application. Follow manufacturer's written instructions for thinning packaged paint. Use of thinner shall not relieve Contractor from obtaining complete hiding. Do not mix paints of different manufacturers.

3.2.2.2 Pretreatment wash: Mix by adding one volume of acid component to four volumes of resin component. Add acid component slowly to resin component with constant stirring. Use within eight hours. Material may be reduced with normal butyl alcohol or 99% isopropyl alcohol, if thinning is required to maintain wet spray.

### 3.2.3 Protection

3.2.3.1 Cover or otherwise protect finished work of other trades, surfaces not to be painted, or surfaces not concurrently being painted.

3.2.3.2 Provide sufficient drop cloths, shields, and protective equipment to prevent spray or drippings from fouling surfaces not being painted, including surfaces in paint storage and preparation areas.

3.2.3.3 Place cotton waste, cloths, and materials which may constitute fire hazard in closed metal containers and remove daily from jobsite.

3.2.3.4 Where toxic materials, and both toxic and explosive solvents are used, take appropriate precautions in accordance with manufacturer's written instructions and applicable safety regulatory agencies. In applying acid etch coating or solutions to metals or concrete, provide ventilation and take protective measures to meet requirements of safety regulatory agencies.

## 3.3 APPLICATION

3.3.1 Surfaces to be Painted and Finished: Paint surfaces scheduled or shown. Finish factory-primed materials in accordance with this Section.

3.3.2 General: Paint may be applied by brush, roller, or spray unless otherwise specified. At time of application, paint shall show no signs of deterioration. Maintain uniform suspension of pigments during application.

3.3.2.1 Apply paint so finished surfaces are free of runs, drops, ridges, waves, laps, brush marks, and variations in color, texture, and finish. Hiding shall be complete. Apply each coat as film of uniform thickness. Use rollers of type designed for coating to be applied and surface to be coated. Ensure that surfaces including edges, corners, crevices, welds, and rivets receive film thickness equivalent to adjacent painted surfaces.

3.3.3 Coating Progress: Allow time between successive coats to permit proper drying. Modify drying times to suit abnormal environmental conditions. Oil base or oleoresinous solvent-type paints are ready for recoating when paint feels firm, does not deform or feel sticky under moderate pressure of thumb, and application of another coat of paint does not cause lifting or loss of adhesion of undercoat.

3.3.4 Time Between Surface Preparation and Painting: Apply first coat on surfaces that have been cleaned, pretreated, and otherwise prepared for painting as soon as practicable after such pretreatment has been completed, but before deterioration of prepared surface.

3.3.5 Pretreatment Wash Coat: Apply vinyl-type wash coat by brush or spray. Maintain wet spray at all times.

#### 3.4 CLEANING

3.4.1 At completion of each day, remove painting materials, empty containers, rags, cloths, brushes, or other equipment. Store or dispose of as appropriate.

3.4.2 As work proceeds and upon completion, promptly remove paint where spilled, splashed, or spattered.

3.4.3 At conclusion of work, leave premises neat and clean to satisfaction of the Government's Representative.

#### 3.5 PAINTING AND FINISH SCHEDULE

	Minimum Dry Film
3.5.1 Exterior	
3.5.1.1 Ferrous Metal, Enamel, Gloss	
Pretreatment: MS DOD-P-15328	0.5 mil
Prime Coat: FS TT-P-645	1.5 mil
2nd Coat: FS TT-E-489, Class A	1.5 mil
Finish: FS TT-E-489, Class A	1.5 mil
3.5.1.2 Galvanized Metal, Enamel, Gloss	
Pretreatment: MS DOD-P-15328	0.5 mil
Prime Coat: FS TT-P-641, Type II	1.5 mil
2nd Coat: FS TT-E-489, Class A	1.5 mil
Finish: FS TT-E-489, Class A	1.5 mil
3.5.2 Use products of same manufacturer within coating system.	

3.6 COLOR SCHEDULE: Colors shall be as follows:

3.6.1 Barricade Posts and Drain Sump Signs: Safety yellow, PPG No. 23-780.

END OF SECTION

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